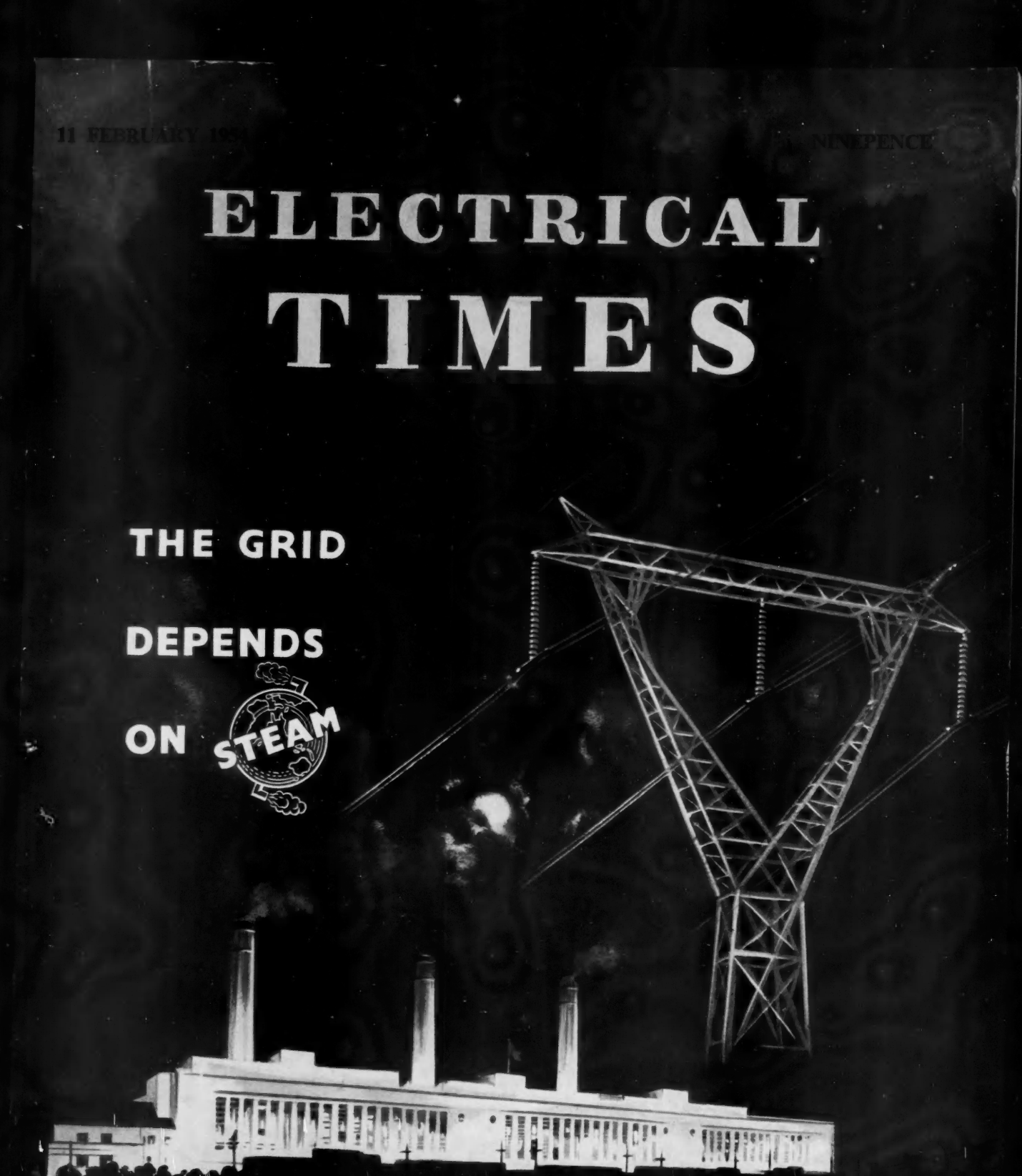
11 FEBRUARY 1954 NINEPENCE

ELECTRICAL TIMES

THE GRID DEPENDS ON STEAM



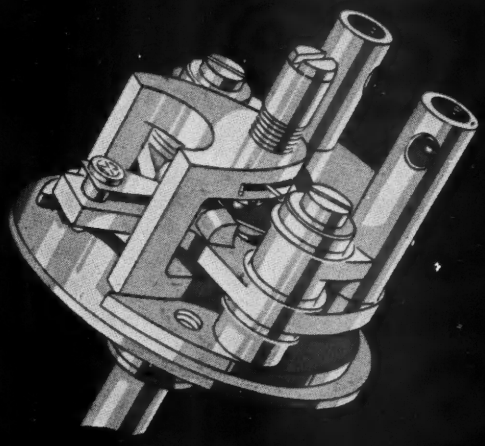
THE STEAM-RAISING PLANT OF NEARLY HALF THE POWER STATIONS FEEDING THE BRITISH GRID AND SUPERGRID IS BABCOCK DESIGNED AND BUILT.

STAYTHORPE POWER STATION

BABCOCK STEAM-RAISING PLANT

Water heater thermostat

WITH A DIFFERENCE



An all-in-one-piece electrical circuit (instead of innumerable screw contacts) — a positive action, Simmerstat-type switch — sooner or later these are going to make a difference to your maintenance costs . . . . . ?

SUNVIC

Domestic temperature controls

SUNVIC CONTROLS LTD., SUNVIC HOUSE, ESSEX STREET, LONDON, W.C.2

Member of the A.E.I. Group of Companies

Sales Dept.: No. 1 Factory, Eastern Industrial Estate, Harlow, Essex. Telephone: Harlow 2031

TAS/SC 263

S&L

TUBULAR STEEL LIGHTING COLUMNS

25 ft. M.H. for Group 'A' Roads

SUITABLE FOR ELECTRIC LIGHTING

This is one of a series of illustrations indicating our range of tubular steel lighting columns in accordance with B.S. 1840. It shows single and double bracket arm columns, types Gb. 503 and Gb. 557, erected by the County Council of Lanark. Other designs, plain or fluted, for 13 ft., 15 ft., and 25 ft. mounting heights, will appear from time to time. A folder showing our standard columns will be sent on application.

STEWARTS AND LLOYDS LIMITED

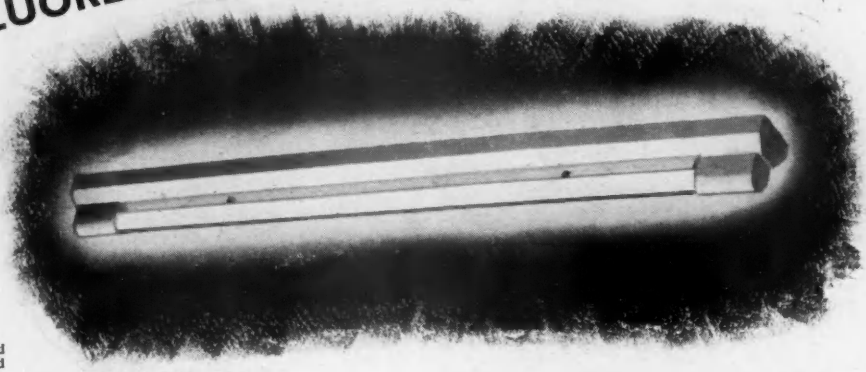
GLASGOW · BIRMINGHAM · LONDON

The largest manufacturers of steel tubes in Europe

A

ANNOUNCING the MORLITE 4-STAR FLUORESCENT LIGHTING FITTINGS with the NEW 'SUPER-HARD' Enamel Finish

Fluorescent MORLITE lighting



This new finish will not flake, crack, chip or discolour. Write for illustrated catalogue showing full range of standard fittings.

★ **POSITIVE STARTING** (Quick Start or Switch Start).
★ **NOISELESS IN USE** (No Noise Level).
★ **QUICK DELIVERY . . . and, of course, our**
★ **TWO YEARS'** (Unconditional) **GUARANTEE**

MODEL S.B.5. **£2.19.6** (NETT)
Complete with all Control Gear (less tube)

MORLEY'S ELECTRICAL SERVICES LTD.
117 Hornsey Road, London, N.7 · Telephone: NORth 5008

LEGG INDUSTRIES LIMITED

Legg Industries Limited design and manufacture Charging Equipment for Electric Vehicles and Trucks of all types and the majority of leading manufacturers specify LEGG CHARGERS for use with their equipment—both at Home and Abroad.

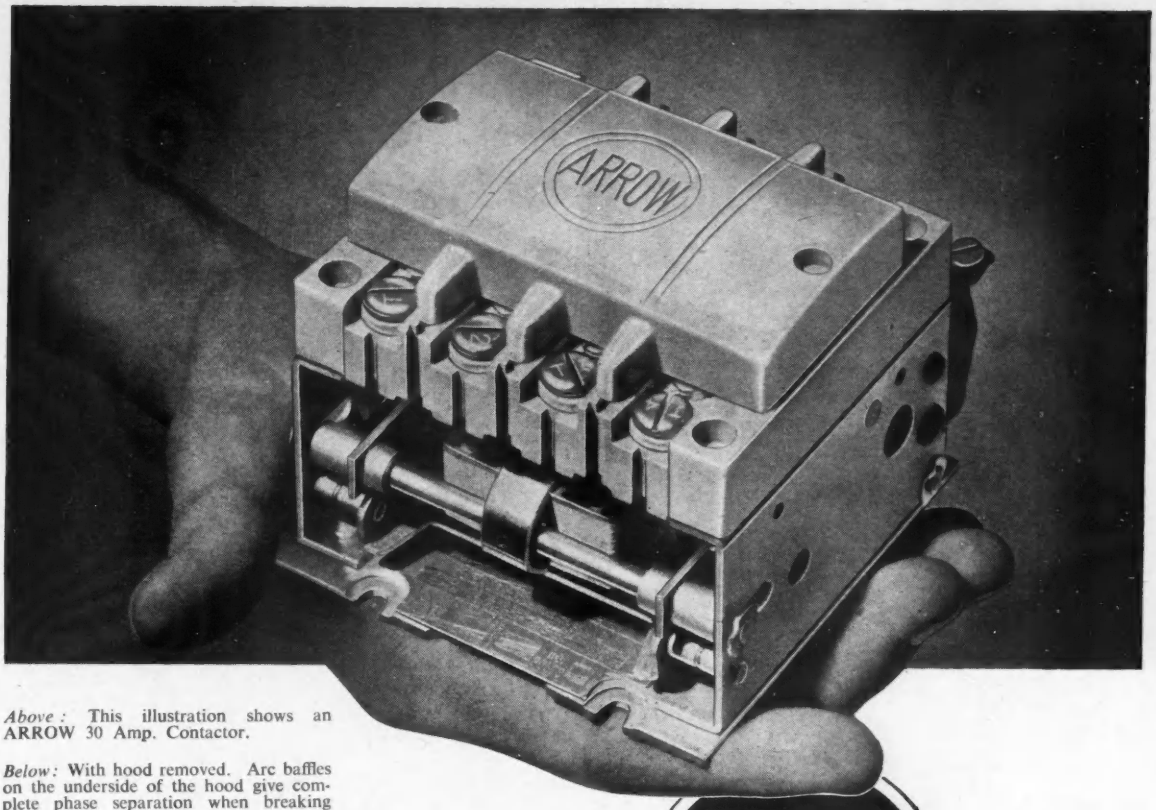
WHEN YOU PURCHASE A LEGG CHARGER YOU ENSURE YEARS OF RELIABLE SERVICE

Chargers are also designed and manufactured to comply with C.S.A. requirements.

Legg **VEHICLE CHARGERS**

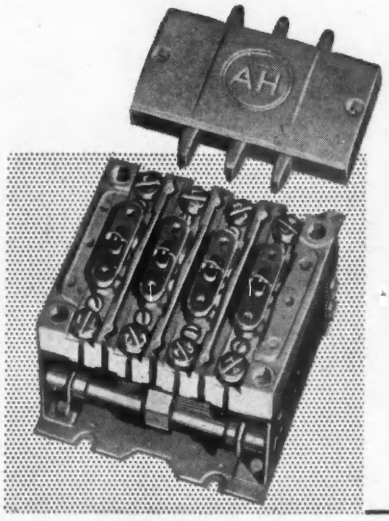
LEGG (INDUSTRIES) LTD.
WILLIAMSON ST, WOLVERHAMPTON
5723D

THE SMALLEST PANEL-MOUNTING CONTACTOR ON THE MARKET!



Above: This illustration shows an ARROW 30 Amp. Contactor.

Below: With hood removed. Arc baffles on the underside of the hood give complete phase separation when breaking circuit.



ARROW

Complies with B.S.S. 775 for breaking capacity • 50% saving in weight and size • Coils and contacts changed in a matter of seconds • Exceptionally low wattage consumption • "Straight-through" wiring connections • Conforms with U.S. N.E.M.A. specification • Comprehensive spares facilities in U.S.A. and Canada • Three sizes—30, 50 and 100 Amps. at 550 Volts A/C rating • D/C ratings on request.

SEND FOR LEAFLET M.C.G. 2

ARROW ELECTRIC SWITCHES LTD · HANGER LANE · LONDON · W.5

FOSTER *portable* EARTH-LOOP RESISTANCE TEST SET

EARTH-LOOP RESISTANCE TEST SET
OPERATING INSTRUCTIONS
FOR USE ON 200/250 VOLT, 50 CYCLE, A.C. CIRCUITS.
A. To test the loop resistance of the earth and neutral conductors at any point at which a supply is available.
1. Switch ON mains.
2. Select main polarity so that Neon indicator is ON.
3. Switch test reversing switch to position 1.
4. Switch test key to normal position.
5. Push test button and adjust pointer so that the balance indicator reading is minimum.
6. Record the reading on the dial.
7. Change test reversing switch to position 2.
8. Push test button and re-adjust pointer so that the balance indicator reading is minimum.
9. Record new reading on the dial.
10. Take the average of the two readings and deduct 0.15 ohm to allow for the resistance of the internal leads etc.
B. To test the resistance of any separate dead circuit by connecting it to the terminals marked 'N' and 'E'.
Operations 1 and 3 as above.
4. Switch test key to separate circuit test.
5. As above.
No deduction need be made for the internal resistances. The value of the test resistance is therefore indicated directly on the dial.
FOSTER TRANSFORMERS LIMITED, SOUTH WIMBLEDON, S.W.19
SPARE FUSES.
FOSTER TRANSFORMERS LTD
EARTH LOOP RESISTANCE
TESTER MK. 1C
BALANCE INDICATOR
SEPARATE CIRCUIT
N
E
MAINS OFF
MAINS POLARITY
REVERSING SWITCH
NORMAL POSITION
PUSH TO TEST
ON
A
B
1
2
SEPARATE CIRCUIT TEST
OHMS

This portable test set gives the value of the earth-neutral resistance of :—

(a) the supply to the apparatus, by passing a current through the earth-neutral loop in both directions (thus taking into account any potential which may add or subtract to the normal reading) and adjusting the potentiometer to give a minimum reading on the balance indicator. The readings are then taken directly off the potentiometer scale, averaged and a fixed ohmic value deducted for the mains lead.

(b) any dead circuit, by adjusting the potentiometer to give a minimum reading on the balance indicator, the value of resistance being read directly off the potentiometer scale.

The equipment is contained in a polished hard wood case fitted with rubber feet, leather carrying handle and 6 ft. of triple core flexible cable.

★ *Write today for full technical details*

Size 8¼"x 7½"x 5⅜" high · Weight 7 lbs.

Price **£16·0·0** *each*

Waterproof carrying case £1·8·0 *extra*

FOSTER TRANSFORMERS LTD SOUTH WIMBLEDON LONDON SW19

A 'LANCASHIRE DYNAMO HOLDINGS' COMPANY

T/4

Think of these...

Asbestos Woven Resistance Grids
Battery Charging Rheostats
Lighting Dimmers
Loading Resistors, Fixed and Variable
Meter Testing Rheostats
Motor Operated Rheostats
Motor Starters, D.C.
Resistors wound on Asbestos, Mica, Mycalex and Porcelain for Radio Communications, Electronics, etc.
Potentiometer Rheostats
Reversing Potentiometer Rheostats
Series Rheostats
• Shunt-field Rheostats
• Slider Type Rheostats, Tubular and Slate-wound
Switches, Radial Multi-stud Pattern
Switches, Straight Line Multi-stud
Transformer Tap Change Switches
• Toroidal Potentiometer Rheostats
Tubular Resistors, Fixed and Tapped
Welding Resistors and Rheostats

* * *

Asbestos Woven Heating Nets
Air Heaters, Electric
Cartridge Heater Units
Heating Elements wound on Mica, Porcelain, Asbestos
Industrial Equipment, Electrically Heated
Steel-jacketed Heater Units

...and you think of

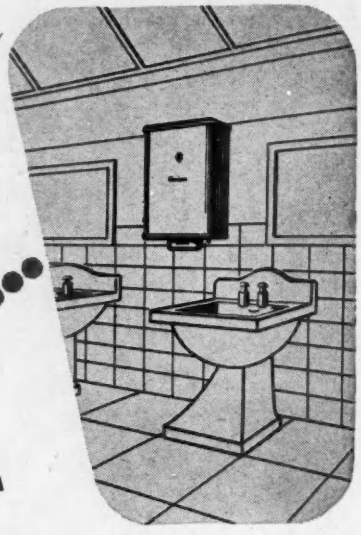
CRESSALL

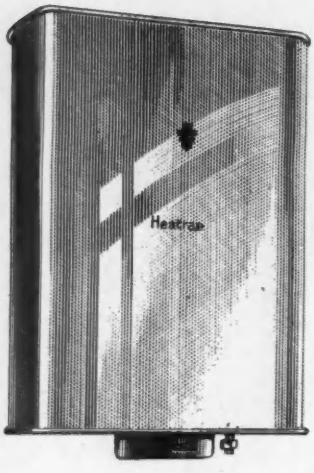
THE CRESSALL MANUFACTURING CO. LTD.
TOWER STREET · BIRMINGHAM 19

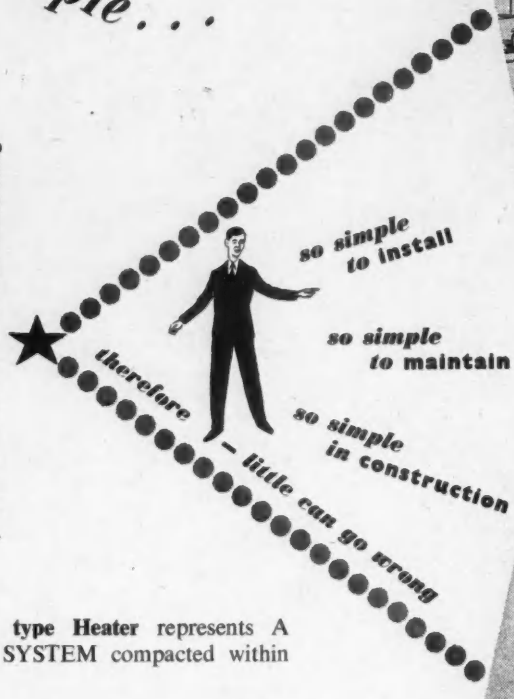
Simplicity—The Hallmark of Genius....

Heatrae *electric water heaters*

are so simple...



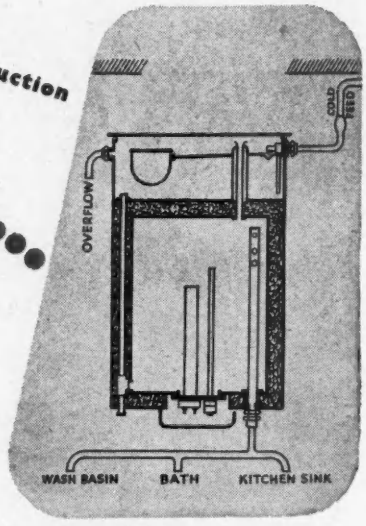




The **Heatrae F.B. Storage type Heater** represents A COMPLETE HOT WATER SYSTEM compacted within minimum dimensions.

It has integral ball-valve cistern, expansion pipe, overflow connection union, etc., for hot water outlet, and is the ideal apparatus for Restaurants, Flats, Offices, etc., where constant supplies of hot water are wanted.

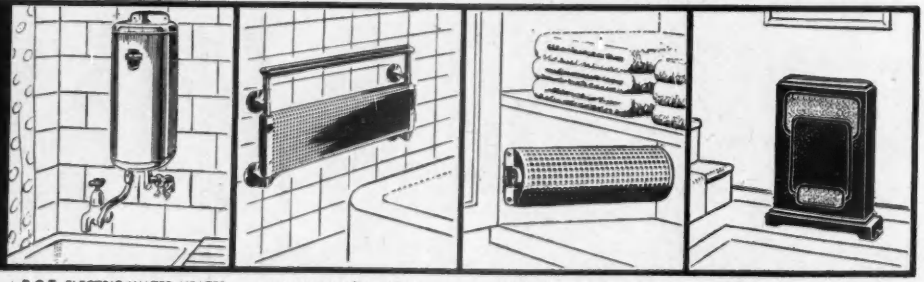
For fuller details write for our Leaflet DEG.



Heatrae

30 years specialised experience in designing and manufacturing of Electric Water Heaters

Here are some of the extensive range of our products for industrial and domestic uses...



• D.O.T. ELECTRIC WATER HEATER • AIR WARMER/TOWEL RAIL • AIRING CUPBOARD HEATER • ELECTRIC AIR CONVECTOR

Advertisement issued by HEATRAE LTD · NORWICH · ENGLAND

B.S.D.
BRITISH STANDARD DIMENSIONED

Type 'LY' motors

Frames B.183 to B.326 inclusive

'ENGLISH ELECTRIC' are the makers of the range of totally-enclosed fan-cooled motors — the 'LY' series — which conform to British Standards and supersede many other enclosures. These motors comply fully with B.S.168 and draft specification CN(ELE) 6814 of the British Standards Institution.

Dimensions are similar to those laid down in the American NEMA Standard MG1-1949, but for a similar frame size the horse-power outputs are increased to accord with the generally accepted British practice. Frame B.225 is illustrated.

'ENGLISH ELECTRIC'

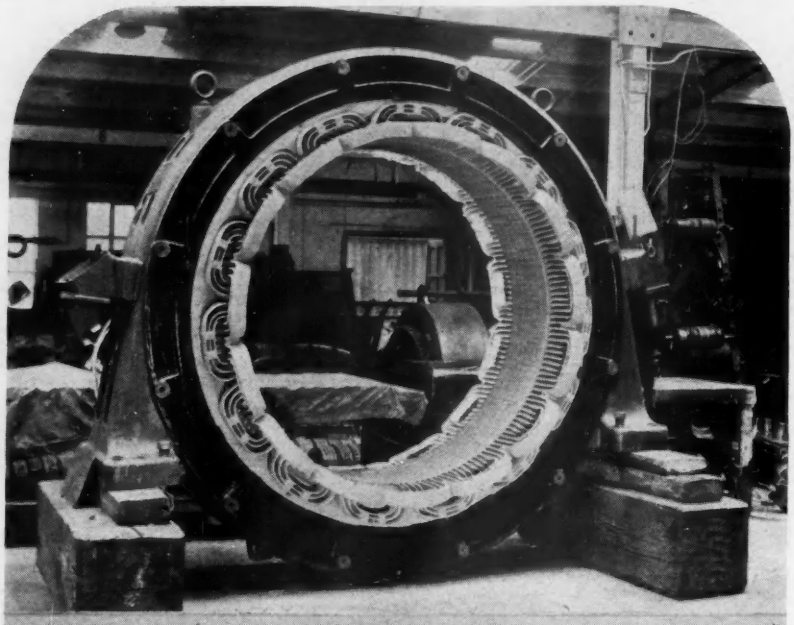
industrial motors

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Industrial Motor Works, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

BM.18

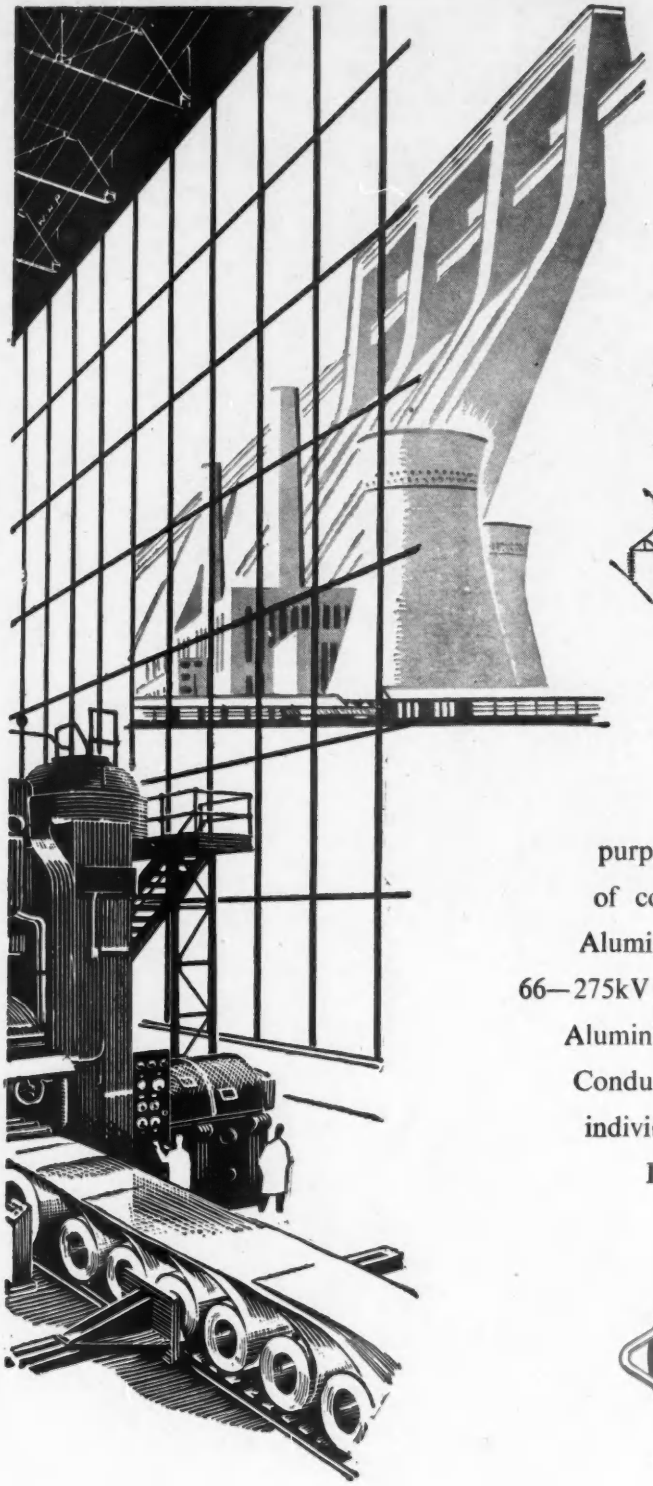


This 889 kVA. 6·6 kV. 300 r.p.m. Alternator was rewound at Wembley Park Works for service in a tropical climate. We take pride in yet another instance of customer confidence in our experienced reconditioning of used electrical plant.

DYNAMO & MOTOR REPAIRS LTD.

Wembley Park Works
North End Road
Wembley, Middx.
Wembley 3121

Phoenix Works
Soho Road
Birmingham
Northern 0898



The *Powerful* Link for INDUSTRY

Aluminium overhead conductors are indispensable to industrial undertakings. Depending on the size, location, nature and industrial purpose of the factory or works, various types of conductor will be required. Steel-Cored Aluminium is ideal for the high voltage range, 66—275kV; SILMALEC high tensile, low resistance Aluminium Alloy for 11—33kV; All-Aluminium Conductors for low tension—440 volt—supply to individual factory buildings and outdoor plant. Industry depends on electricity; electricity depends on Aluminium.

AWCO

ALUMINIUM WIRE & CABLE CO. LTD.

Britain's Largest Manufacturers of Aluminium Wire and Conductors

HEAD OFFICE AND WORKS: PORT TENNANT, SWANSEA, GLAMORGAN

SALES OFFICE: 30 CHARLES II STREET, ST. JAMES'S SQUARE, LONDON, S.W.1

Telephone :—TRAFALGAR 6441

210-72

HIGGS MOTORS LTD
TRADE MARK
CHAIRMAN WALTER F. HIGGS M.I.E.E.
BIRMINGHAM 6 ENGLAND

Higgs Fractional H.P. Motors
Competitive Prices
Despatch from Stock
and
GUARANTEED FOR EVER

Belfast, Bristol, Cardiff, Dundee, Glasgow, Hull, Leeds, Liverpool, London, Manchester, Newcastle, Peterborough, Sheffield, Wolverhampton

INSULATED CHAMPIONS

For sixty years Connollys have had the honour of supplying the ever increasing needs of electrical manufacturers using winding wires.

Their new factory at Kirkby, the most modern of its kind in the world, has enabled them to extend very widely their range of products which now include paper covered, cotton and glass covered strips.

Your enquiries will be welcomed.

Samples gladly supplied on request.

•

The largest manufacturers of fine enamelled wire in the world.

CONNOLLYS *Winding Wires*

CONNOLLYS (BLACKLEY) LIMITED

Kirkby Trading Estate, Near Liverpool

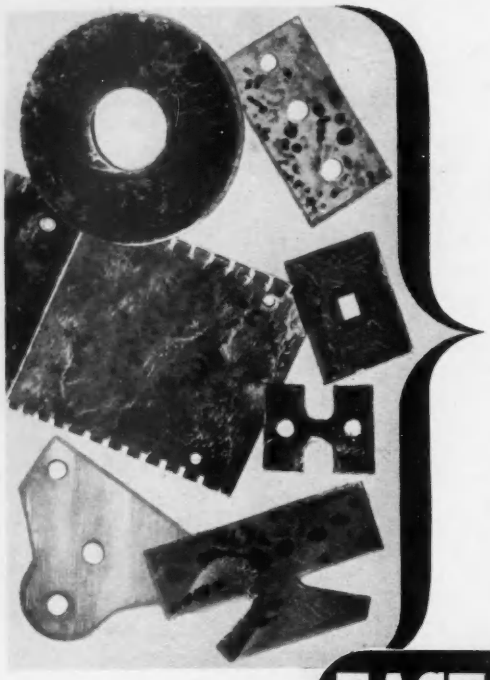
Telephone: SIMonswood 2664. Telegrams: "SYLLONOC, LIVERPOOL"

Branch Sales Offices:

SOUTHERN:
34, Norfolk Street, Strand, London, W.C.2.
TEMple Bar 5506.

MIDLANDS:
15/17, Spiceal Street, Birmingham.
MIDland 2268.

NORTHERN:
Blackley, Manchester, 9.
CHEetham Hill 1801.



MICA

Electrical Insulation

We specialise in the fabrication of all types of pure Mica Insulations, and can assist you by maintaining a High Standard of Quality at Competitive Prices.

We shall be pleased to receive your inquiries.

Telephone:
COPpermill 2248/9
Telegrams:
Elmicmer, Easphone, London

EAST LONDON MICA WORKS

RINGWOOD RD., WALTHAMSTOW, LONDON, E.17

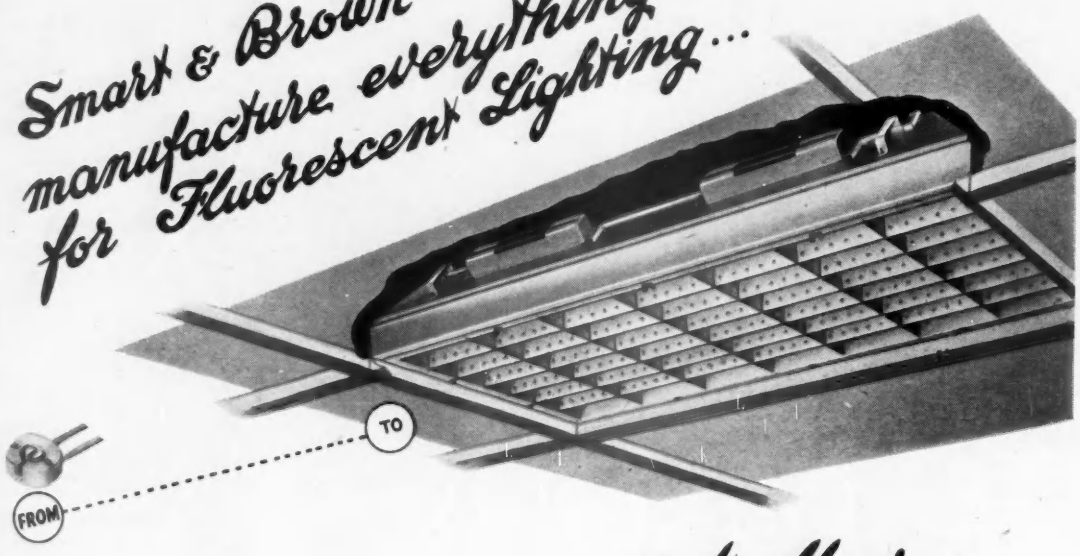
ESTD. 1912

SB

SMART & BROWN (ENGINEERS) LIMITED

FLUORESCENT LIGHTING

Smart & Brown manufacture everything for Fluorescent Lighting...



...and all are guaranteed!

Head Sales Office:
8 Rose & Crown Yard, King Street, St. James's, London, S.W.1.
Telephone: Whitehall 8267/8.

IGA4

The SWIRLUX 500

does MORE

costs LESS

..heats the water too!

Serial No. ★ 1838
BRITISH
GOOD HOUSEKEEPING INSTITUTE
GUARANTEES
REFUND OF MONEY OR REPLACEMENT IF NOT IN CONFORMITY WITH THE INSTITUTE'S STANDARDS

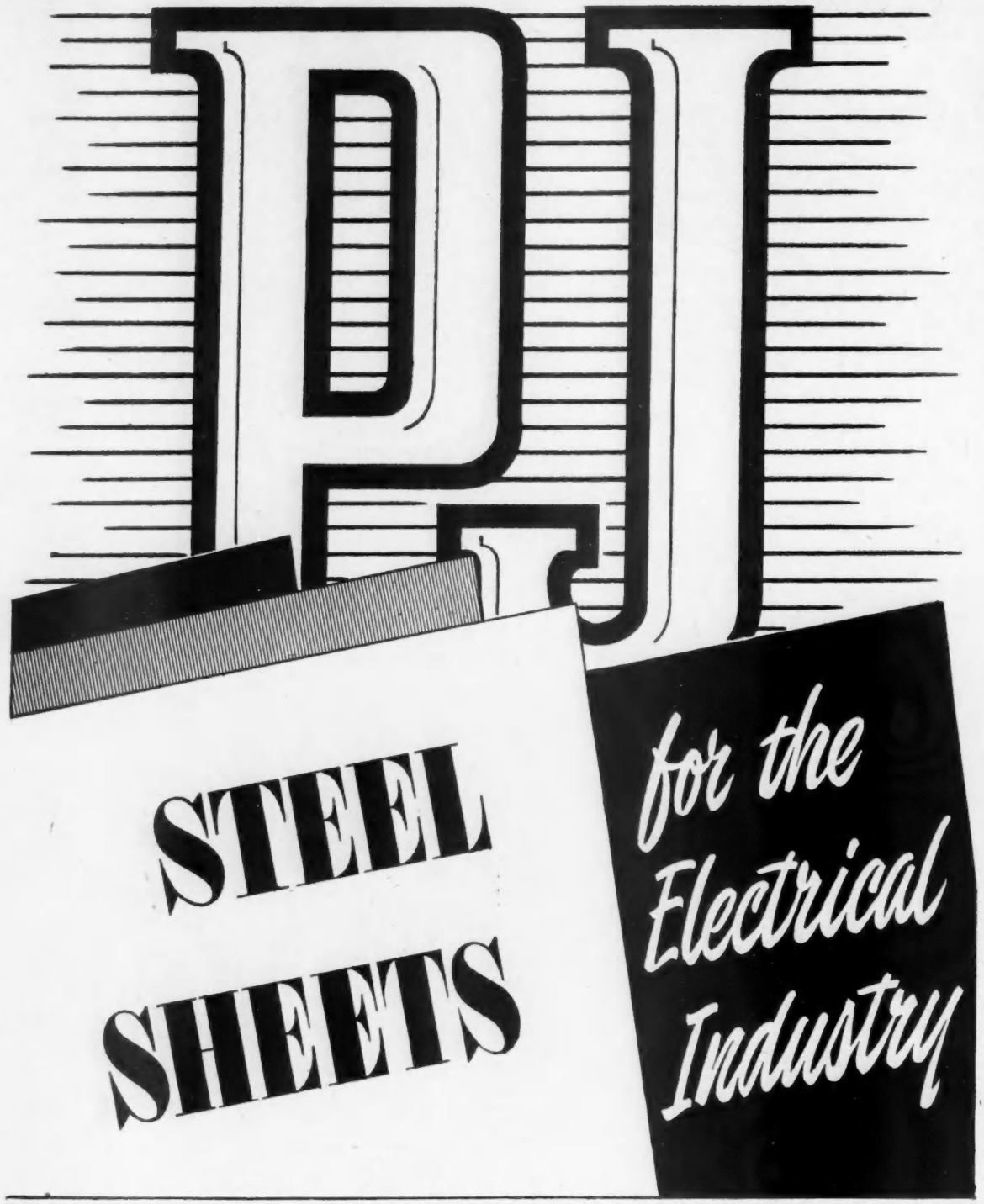
Heated model £36.9.8 plus £11.19.5 Purchase Tax
Non-heated model £33.8.4 plus £10.17.0 Purchase Tax

SWIRLUX

Full details from:

UNIVERSAL BOILERS & ENGINEERING CO. LTD.
FULLEDGE WORKS, BURNLEY, LANCASHIRE. Phone: Burnley 3121

ndh. 265



PARTRIDGE JONES & JOHN PATON LTD

PONTNEWYNYDD NEAR PONTYPOOL

Telephone: Pontypool 131/2

CHANNEL of POWER

If electricity is to be of any use, it must, like all power, be directed along chosen channels. That is where steel conduit plays a vital part . . . it is to a building, what the artery walls are to the body. It must therefore be of the highest quality —utterly dependable. And that is automatically assured if you deal with any member of the A.S.C.M.

• *See the A.S.C.M. mark on every length.*

Advertisement of the

ASSOCIATION OF STEEL CONDUIT MANUFACTURERS

96 Hagley Road • Birmingham, 16

N.C.S. PLATFORM SCALE AMMETER

N.C.S. POWER FACTOR INDICATOR

N.C.S. ROTARY SYNCHROSCOPE

N.C.S. FREQUENCY METER

For QUALITY NALDERS *Electrical* MEASURING INSTRUMENTS

YOUR needs are well catered for by Nalders wide range of Instruments—Indicating, Recording, Switchboard, Portable — and **Quality** is the characteristic of every type. All instruments conform to B.S.S. 89, cases being of Rectangular, Square or Round pattern in die cast aluminium or pressed steel, finished bright black stove enamel or other colour to customer's requirements. Four typical instruments only can be illustrated.

NALDERS N C S PRODUCTS

MEASURING INSTRUMENTS of ALL TYPES
Indicating, Recording, Switchboard, Portable
also
PROTECTIVE RELAYS
VECTORMETERS
AUTOMATIC Earth Proving SUPPLY SWITCH
"BIJOU" CIRCUIT BREAKERS

Your enquiries will be welcomed

NALDER BROS. & THOMPSON LTD

DALSTON LANE WORKS, LONDON, E.8

Telephone: Clissold 2365 (3 lines) Telegrams: "Occlude, Hack, London"

THE "SATCHWELL" TYPE V THERMOSTAT FOR ELECTRIC WATER HEATERS IS AN INSTRUMENT OF QUALITY

A PRODUCT OF

THE RHEOSTATIC COMPANY LIMITED SLOUGH

Telephone :
SLOUGH 23311 (6 lines)

Telegrams :
RESISTANCE, SLOUGH

Switchboard Watchdogs

Install Brush H.R.C. cartridge fuse links to stand guard over your valuable electrical plant. These watchdogs—tireless thoroughbreds—never sleep. If a heavy, damaging fault current tries to slip past they snap it off well before the peak is reached. Voltage rise is negligible. A special shunt wire indicates the particular fuse which made the kill. The Brush H.R.C. fuse link range covers current ratings from 2 to 300 amperes and is to British Standard djmensions. Ask for the complete pedigree in Publication No. 81002.

H.R.C. Fuse Links by BRUSH

The Brush Electrical Engineering Co., Ltd., Hopkinson Works, Cardiff, Great Britain

B.31/1

BIRMINGHAM . BRISTOL . GLASGOW . IPSWICH . LEEDS . LONDON . LOUGHBOROUGH . MANCHESTER . NEWCASTLE . SHEFFIELD

Preserve RURAL Amenities

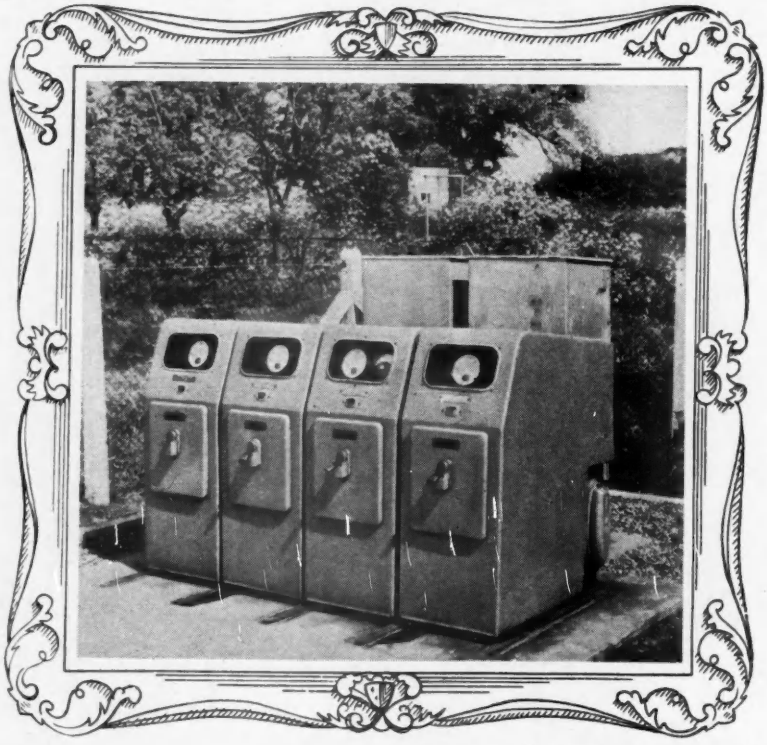
IVIO SWITCHGEAR 11 kV
(Outdoor Substation)

Photographed after 3 years' service in the Home Counties.

Transformer and Feeder units with relay, telephone and battery cabinets at rear,

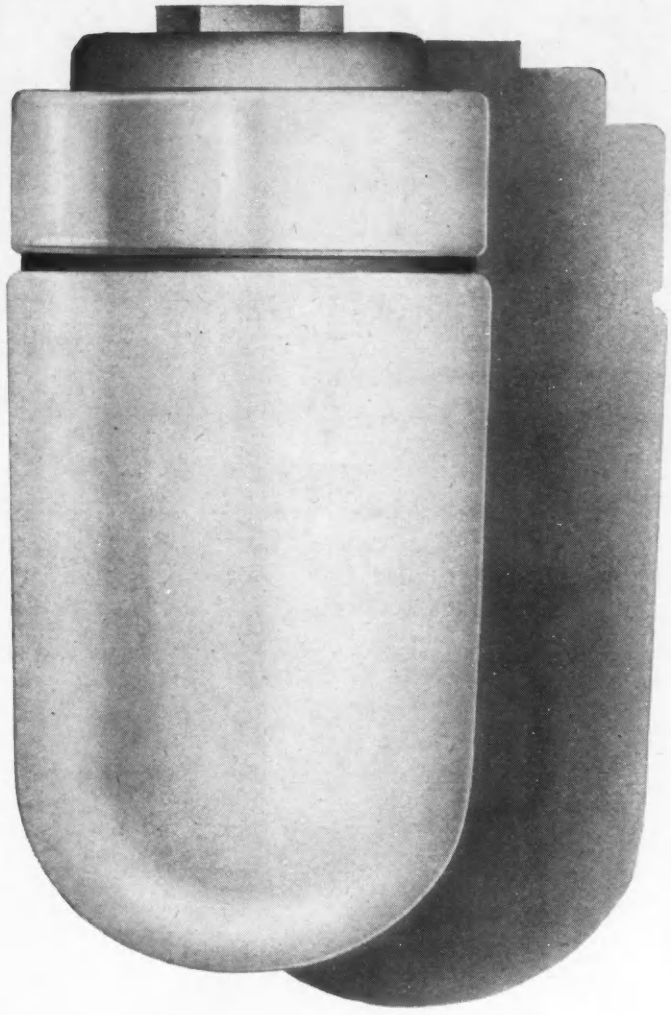
"Plug-in" Load M/B or Fault Make oil switches, or automatic Fuse units can be supplied interchangeable with o.c.b. units.

(Available for indoor use.)



YORKSHIRE SWITCHGEAR & ENG. CO. LTD
LEEDS—LONDON

ASSOCIATED WITH ELECTRO MECHANICAL MFG. CO., LTD., SCARBOROUGH



The Famous

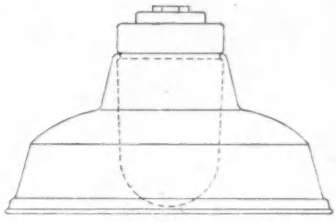
R.E.A.L.

NON-CORRODIBLE WATERTIGHT FITTINGS

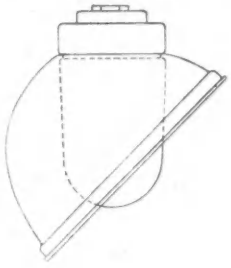
WITH

FEATHERWEIGHT REFLECTORS

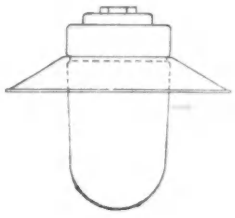
THE famous Watertight Fitting can be supplied with Featherweight Reflectors of Aluminium, Pyluminised, with high temperature baked silver spray finish inside and out.



List Nos. 1002A-1012A Standard Dispersive Model



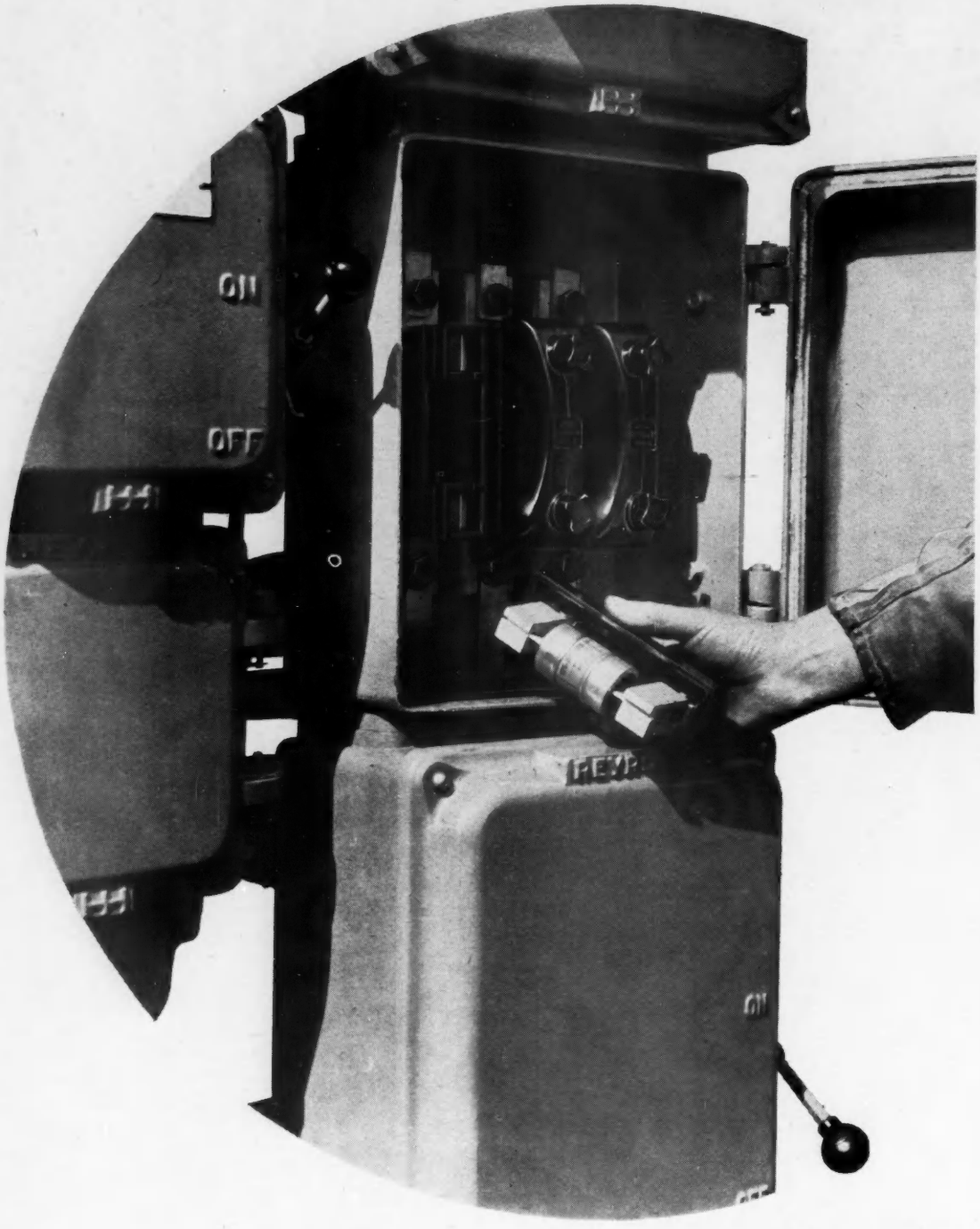
List Nos. 1003A-1013A Standard Angle Concentrating Model.



List Nos. 1004A-1014A Standard Distributive Model.

LIST NO.	LAMP SIZE	REFLECTOR	PRICE EACH
1002A	60 watt	12" Dispersive	28/-
1003A	60 watt	9" Angle Concentrating	24/-
1004A	60 watt	10" Distributive	22/-
1012A	100 watt	14" Dispersive	42/-
1013A	100 watt	11" Angle Concentrating	36/-
1014A	100 watt	10" Distributive	32/-

Issued by Rowlands Electrical Accessories Ltd., R.E.A.L. Works, Birmingham 18



H-H unit-construction distribution-gear is fitted with cartridge fuse-links which are easily removable for inspection or renewal without tools.

Reyrolle

A. REYROLLE & COMPANY LIMITED • HEBBURN • CO. DURHAM

Designed in accordance with BS. 889-1947 these ceiling mounting or pendant pattern flameproof lighting fittings are safe, strong and efficient. They are manufactured in four sizes—60, 100, 200 and 300 watt. The ceiling type joint box may be fitted with up to 4 cable sealing glands, conduit plates or blanking plates, whilst the pendant pattern is tapped for conduit. Supplied in cast aluminium or cast iron and finished in green enamel. Certified by the Ministry of Fuel and Power.

Flameproof

Well Glass Fittings to BS. 889

We have designs to suit every lighting need and welcome your enquiries.

FLP

HEYES *of Wigan*

ESTABLISHED OVER 50 YEARS

LONDON: 11 JOHN STREET, W.C.1

HEYES & COMPANY LIMITED, WATER-HEYES ELECTRICAL WORKS, WIGAN

dm.H.C.78.

WOOTTON
METER BOARDS
AND SWITCH BLOCKS

We have been making and supplying the Electrical Industry with METER BOARDS and Switch Blocks for over 27 years.

- FIRST CLASS WORK
- QUICK DELIVERY
- COMPETITIVE PRICES

We invite your enquiries

WOOTTON & CO., LTD.

ALMA WORKS, PONDERS END MIDDX.

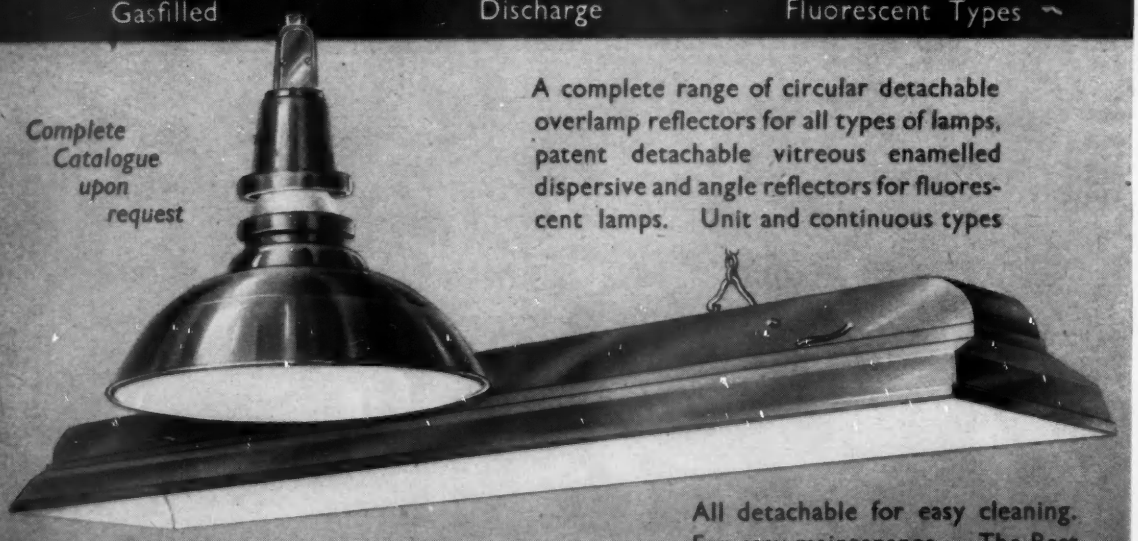
TELEPHONE : HOWARD 1858

THORLUX REGD. INDUSTRIAL LIGHTING EQUIPMENT

Gasfilled Discharge Fluorescent Types

Complete Catalogue upon request

A complete range of circular detachable overlamp reflectors for all types of lamps, patent detachable vitreous enamelled dispersive and angle reflectors for fluorescent lamps. Unit and continuous types



All detachable for easy cleaning. For easy maintenance — The Best

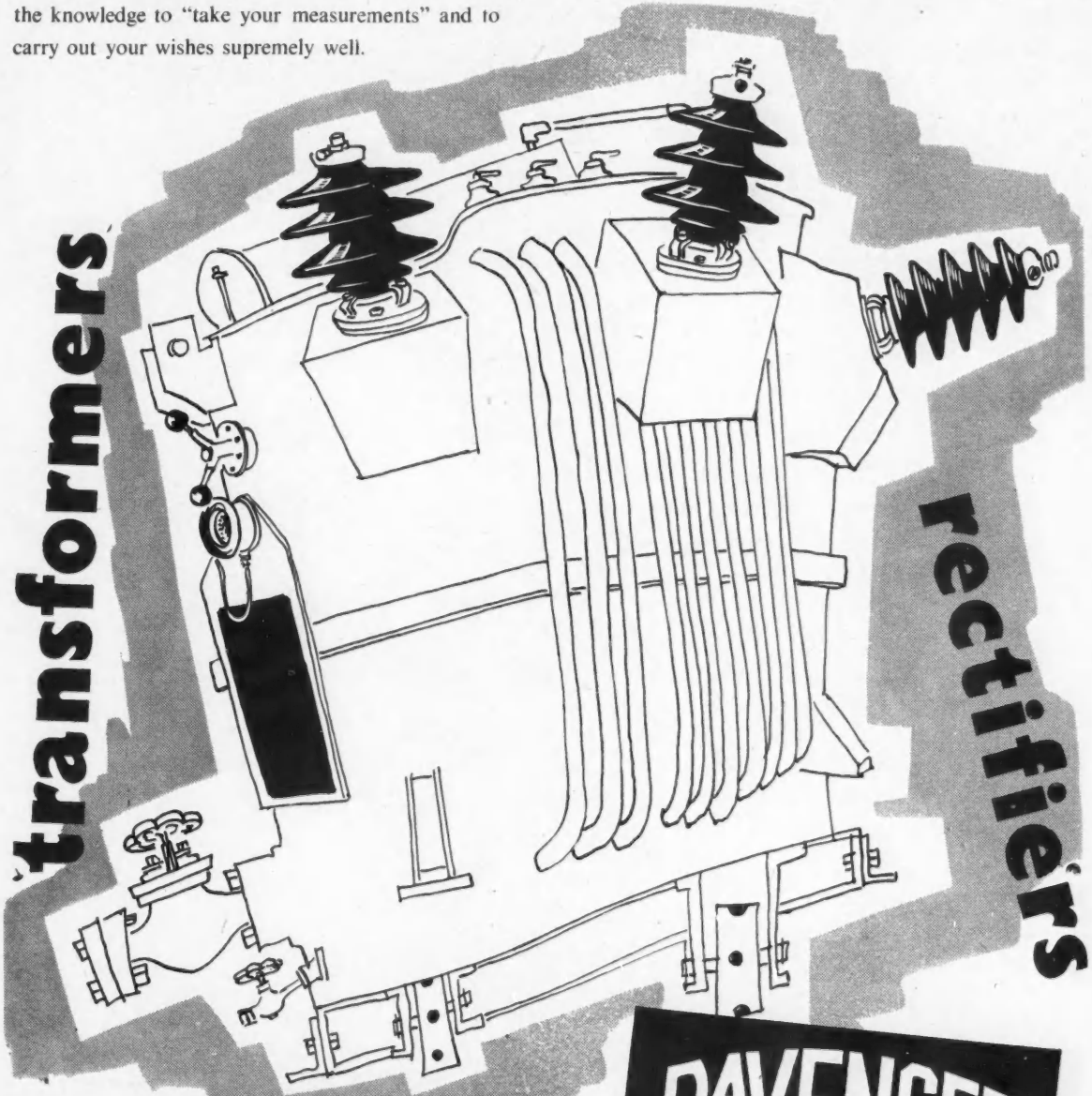
F. W. THORPE LTD WELBY RD HALL GREEN **BIRMINGHAM 28**

SPRINGFIELD 3318 · 3319 · 3310 MANUFACTURERS GRAMS THORLUX B'HAM

a perfect fit

A WELL-TAILORED job brings satisfaction in industry, for every manufacturer likes to be "well-suited." As makers of the famed DAVENSET rectifiers and transformers for many years, we have the knowledge to "take your measurements" and to carry out your wishes supremely well.

But please remember that we also make a standard range of transformers and rectifiers which may equally well suit your requirements. Why not talk it over with our experts?



Specialists in 'tailormade'

TRANSFORMERS and RECTIFIERS

DAVENSET

PARTRIDGE, WILSON & CO., LTD., DAVENSET ELECTRICAL WORKS, LEICESTER

FACT not FICTION

The claims we make for the ARON TYPE eP1 PREPAYMENT METER are

BASED ON FACT!

THE meter element and prepayment mechanism have been long established and are well known for their reliability.

A simple rate change mechanism is incorporated in the meter which enables the rate to be changed in a moment on site without special tools and in order to eliminate the possibility of mistakes the rate is charged in "price per unit" steps, with a clear indication of the operating price. Money in credit is immediately charged at the new rate.

The switch has double contacts and can take and break a maximum load without failure over the whole life of the meter. It is housed in all-insulated case with double barrier insulation to the coining unit.

We can also offer the unique facility whereby all our earlier type of eP prepayment meters manufactured since 1932 can be modernised including fitting a variable rate change mechanism and double contact switch for a nominal charge.

ARON ELECTRICITY METER LTD

72 SALUSBURY ROAD · LONDON, N.W.6

Phone: MAIDA VALE 0182-8

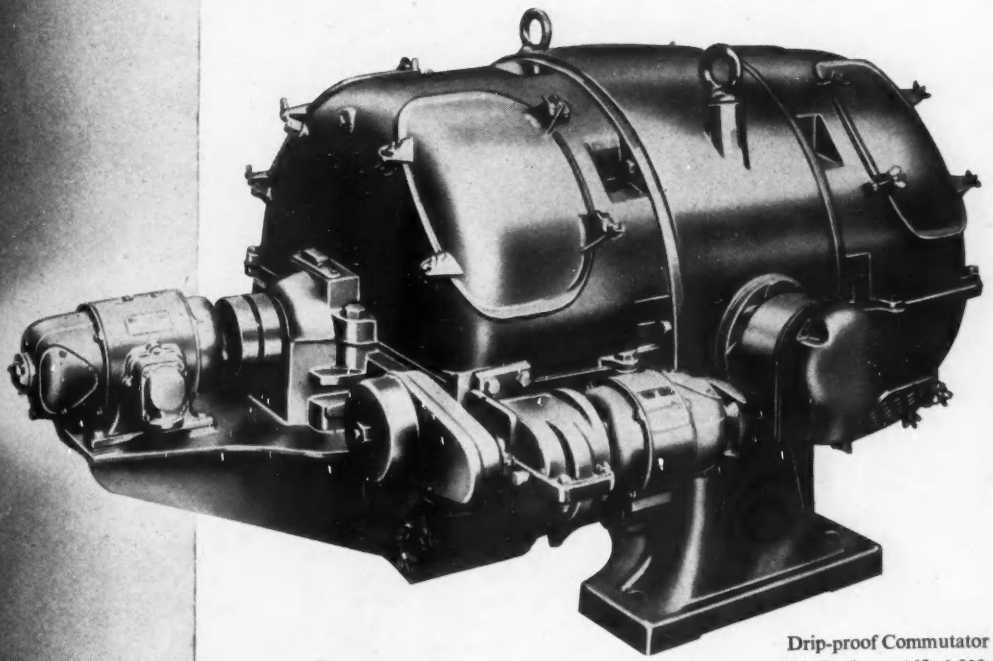
practical experience

In 1910 ASEA built the first Variable Speed A.C. Commutator Motor with shunt characteristics. The ensuing forty-three years have given us a practical experience without equal in the design and construction of these motors.

They are now built in a wide variety of sizes, speed ranges and enclosures. All speed regulation control is within the motor. The standard motor with a 4 to 1 speed range meets most industrial demands but other motors are available with wider infinite speed variation up to 0 to 3,000 r.p.m. at certain outputs. In the race for increased production the advantage of installing our Variable Speed Motors cannot be ignored.

Send for literature today to tell you more of the benefits to be obtained by using these motors.

PROMPT DELIVERY OF CERTAIN SIZES CAN NOW BE OFFERED.

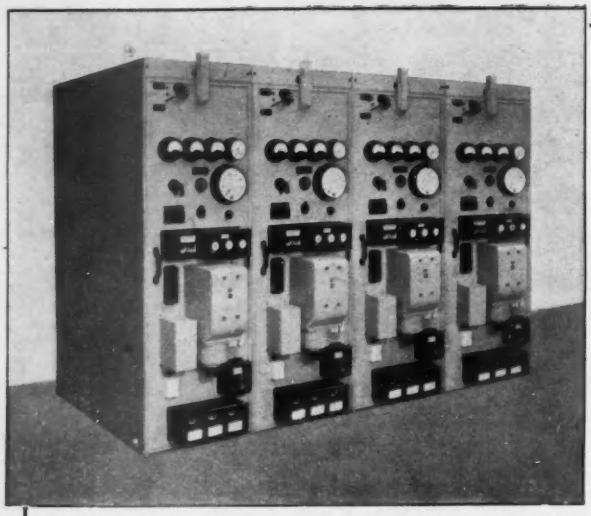


Drip-proof Commutator Motor
10 - 80 h.p., 165 - 1,320 r.p.m.

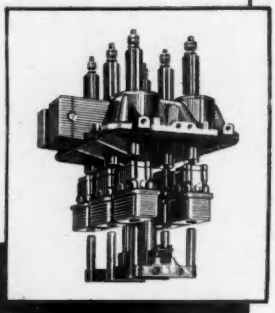
ASEA ELECTRIC LTD. FULBOURNE ROAD, WALTHAMSTOW, LONDON, E.17.
Phone: LARkswood 2350 (10 lines) Grams: Autosyncro, Telex, London.

Branches at: BIRMINGHAM - GLASGOW - MANCHESTER - DUBLIN

C



250 MVA
Switchgear
with
TYPE H. 25
oil circuit breakers
6·6 & 11kV.



The switchgear is of the air insulated truck or fixed cubicle pattern. The oil circuit-breakers are A.S.T.A. certified and may be arranged for hand, spring or solenoid operation. They can be supplied as loose units for the replacement of obsolete breakers.

THE NEW SWITCHGEAR CONSTRUCTION CO. LTD.
WELLESLEY ROAD · SUTTON · SURREY · TELEPHONE: VIGILANT 8234

When it's a question of

I·N·S·U·L·A·T·I·O·N

ask for "ASHLAM" Laminates

"ASHLAM" Laminates are produced from paper, cotton fabric and fibreglass base materials. The fibreglass grades are bonded with Silicone, Melamine, Phenolic and Polyester type resins, and have very high dielectric and insulation properties.

"ASHLAM" Laminates are also available in the form of tubes with fibreglass base bonded with Polyester and Silicone resins.

ask Ashdowns

A S H D O W N S L I M I T E D
ECCLESTON WORKS, ST. HELENS, LANCASHIRE. TELEPHONE: ST. HELENS 3206

Ashdowns Limited is a subsidiary of Pilkington Brothers Limited. "ASHLAM" is the registered trade mark of Ashdowns Limited.

.From every angle

Ashathene is manufactured in all standard sizes and is also available in S.W.A. & D.W.A. classes. Please send for leaflet TL/1001 and price details.

Ashathene provides the answer to an efficient and labour saving electrical wiring in the home and factory. Made to a very high standard, Ashathene is a better cable electrically and mechanically at a lower cost.

Features of Ashathene are:—

HIGH DIELECTRIC—Polythene insulated cores have a measured insulation resistance more than 100 times that of similar rubber insulated material.

HIGH VOLTAGE INSULATION—High voltage tests on Ashathene Cable show a factor of safety 1·6 times greater than the equivalent rubber insulation on the same size of cable.

See the
AERIALITE STAND No. 151
at the
ELECTRICAL ENGINEERS EXHIBITION
Earl's Court **March 16th to 20th**

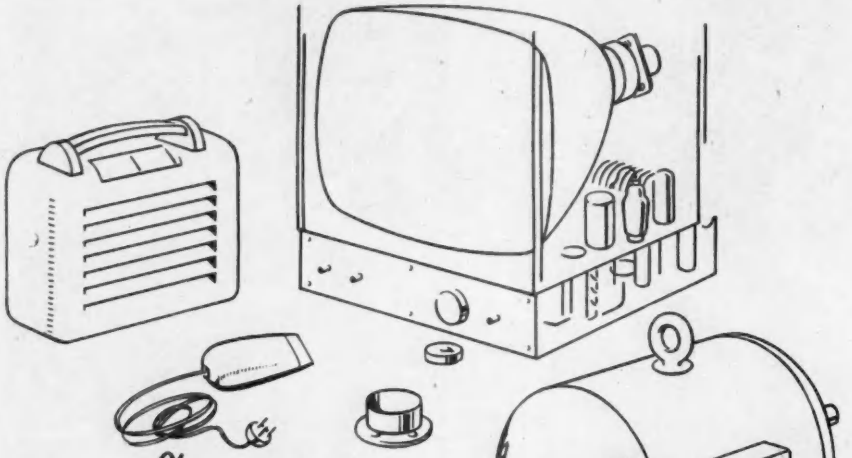
FIRE RESISTING QUALITIES—The P.V.C. used on the sheathing of Ashathene will not support or spread a flame and, unlike rubber, is self extinguishing when the flame is removed.

MECHANICAL QUALITIES — Ashathene is a tough flexible cable which is unaffected by climatic conditions. It is manufactured to give long and trouble-free service. Compared with rubber, polythene insulated conductors will withstand over twice the mechanical pressure without an electrical failure occurring.

ASHATHENE

THERMOPLASTIC INSULATED CABLES

AERIALITE LTD, CASTLE WORKS · STALYBRIDGE · CHESHIRE



As efficient as their weakest joints....

For all soldering operations it is safe to rely on FRY'S products. Our solder range includes TINMANS sticks, to all specifications, BLOWPIPE in 1 oz. strips and cored solder wire for delicate joints. Widely used in the Electrical Industry are the fast, non-corrosive Alcho-Re Fluxes (in paste or fluid form) and Alcho-Re Solder Cream. Technical leaflets or working samples are available on request.

Export enquiries invited

soldering simply means FRY'S

For all electrical soldering where a fast, even spread of solder is essential, and where corrosive after effects are eliminated we recommend

ALCHO-RE FLUXES *by* FRY'S

the solution for all your electrical jointing troubles

FRY'S Metal Foundries Limited

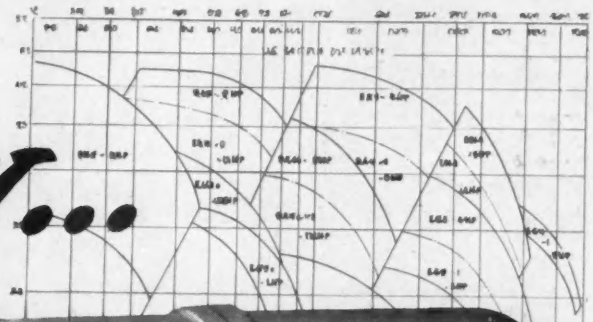
Tandem Works, Merton Abbey, S.W.19. Telephone : MITcham 4023

17

and at MANCHESTER · GLASGOW · BRISTOL · BIRMINGHAM · DUBLIN

For technical advice, and help to solve any soldering problem, please contact our Advice Bureau. We shall be pleased to help you. ?

It's New...



THE SIGMUND PumPak

Exclusive Features include

★ **NEW VENTILATION SYSTEM**

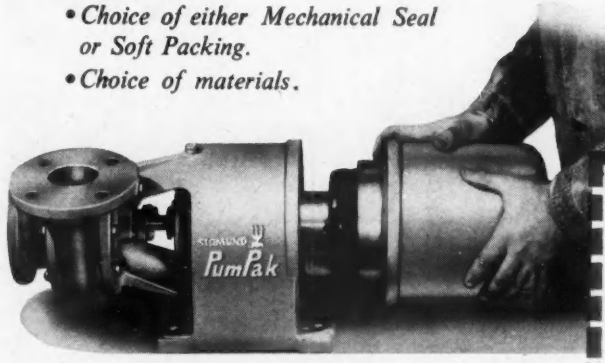
The ventilation design keeps the bearings cool and completely free of gland seepage along the shaft.

★ **REMOVABLE STATOR**

No fuss, no special tools, no interference with pipe connections. Loosen four nuts and draw off the stator.

- *Choice of either Mechanical Seal or Soft Packing.*
- *Choice of materials.*

The Pump with the Removable Stator



SIGMUND PUMPS LTD.

To SIGMUND PUMPS LTD.
Terminal House, Grosvenor Gardens, London, S. W. 1.

Send me, without obligation, details of the Pumpak range.

Name .....

Address .....

..... 32

Burco

MODEL E650 ELECTRIC WASH BOILER

The practical answer to modern washday needs, combining efficiency with attractive design.
Your customer will have trouble-free washing for years with the Burco E650.
Supported by bigger advertising than ever.

The Aristocrats of Electric Washday Appliances

BURCO LTD.
ROSE GROVE, BURNLEY, LANCASHIRE
Also Manufacturers of the famous Burco all-Electric Washing Machine.

The connection is obvious

H. C. ELECTROLYTIC COPPER WIRE, BARS AND STRIP

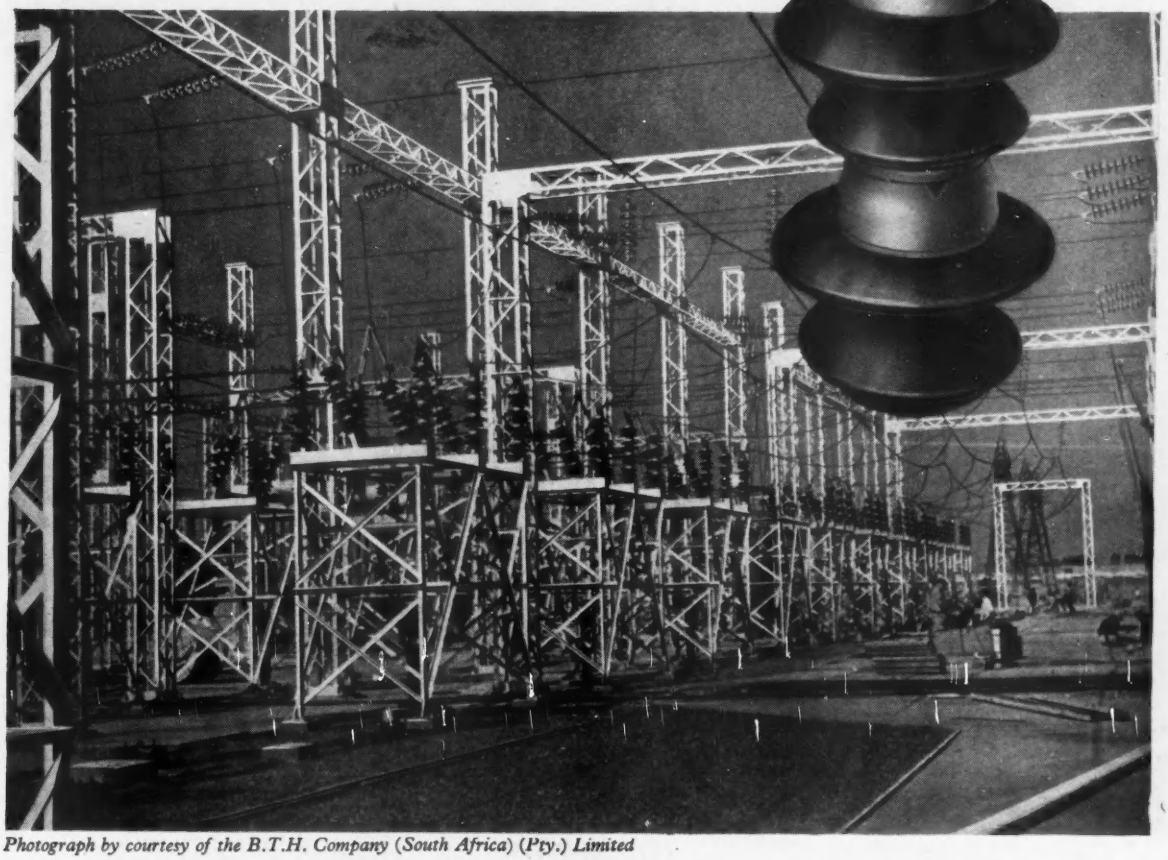
By Spencer Wire

THE SPENCER WIRE CO. LTD., THORNES WIRE MILLS, WAKEFIELD, YORKS.

dm SN33

S.P.P. INSULATORS IN SERVICE

Post insulators in South Africa



Photograph by courtesy of the B.T.H. Company (South Africa) (Pty.) Limited

The 88 kV. Switchyard at Vierfontein Power Station of the Electricity Supply Commission (Rand Undertaking) is one of many for this Authority insulated with S.P.P. Posts of 4-units P.642.

STEATITE & PORCELAIN PRODUCTS LTD.

Stourport-on-Severn, Worcestershire. Telephone : Stourport 111. Telegrams : Steatain, Stourport

SP92

Insulated Wires and Strips
Give protection against burn-outs, severe temperature rises and overloads in heavy duty motor windings

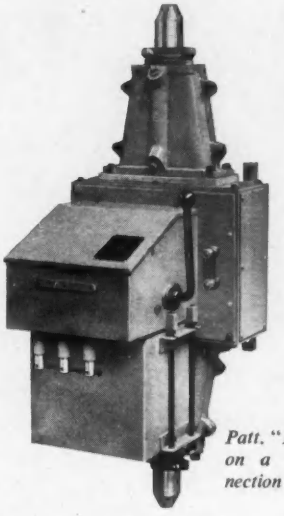
Photograph by courtesy of The Harland Engineering Co. Ltd.

Ensure dependability in the windings

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED
CHURCH ROAD, LEYTON, LONDON, E.10

Incorporating Frederick Smith & Company
Associated with The Liverpool Electric Cable Co. Ltd. and Vactite Wire Co. Ltd.

OIL CIRCUIT BREAKERS

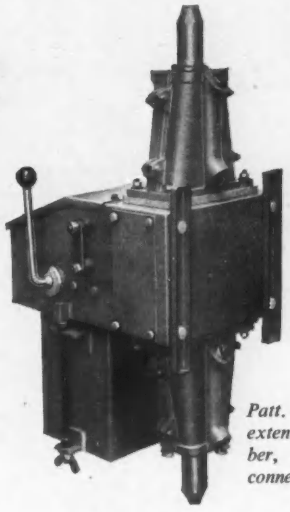


Patt. "B" is mounted on a separate connection chamber.

WALL MOUNTING & PEDESTAL MOUNTED

RANGE F.D. FOR 440 VOLTS A.C.

Type Tested
25 M.V.A.



Patt. "D" has an extended top chamber, for receiving connections.

"F.D." Oil Circuit Breakers are of the triple pole pattern, and complete with three adjustable overload trips also adjustable oil dashpot time lags. An external Neutral Link is provided, when required, for the fourth wire. Both patterns can be supplied with pedestals for floor mounting. Pattern "D" can also fit beneath a Busbar Chamber.

The Oil Circuit Breakers are generously designed to comply with B.S.S.936/40 for 440 Volts A.C., and in consequence are eminently suitable for general industrial service in factories, mills, dockyards, public buildings, etc.

Tests of Rupturing Capacity have been taken on the Oil Circuit Breakers to prove their design, and performance under heavy fault conditions. Data from a test carried out by a Member of the Association of Short Circuit Testing Authorities is available.

Patterns "B" and "D" meet most requirements, but Oil Circuit Breakers with draw-out isolation gear, and for Switchboard and Cubicle mounting are also included in the "FD" range. Standard ratings:—100, 150, 200, 300, 400, 500 and 600 amps.

Write for catalogues OCB and OMS/C.

Rating Certificate No. 726

The Association of Short-Circuit Testing Authorities

ASTA

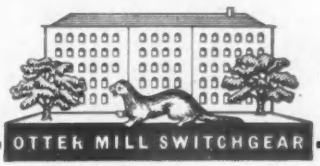
Certificate of Making-Capacity and Breaking-Capacity Ratings

Serial No. 1043

Crompton Parkinson Ltd. — Short-Circuit Testing Station

Crompton Parkinson Ltd.

The Association of Short-Circuit Testing Authorities



See our exhibits on Stand 83 at the A.S.E.E. Exhibition, Earl's Court, London, March 16th to 20th.

G M ENGINEERING (OTTERY ST MARY) LTD

Sales Office: 1 VICTORIA ST LONDON SWI Tel: ABBey 5095 Telegrams: BUSBAR SOWEST LONDON

3050

MAGNET OPERATED BRAKES

Simple design — robust construction — easy adjustment — low maintenance and an unrivalled reputation for efficient and dependable service. These are reasons why you will find IGRANIC TYPE 'M' Brakes installed wherever quick, positive braking is necessary.

The range of sizes available covers brake drums from 8" to 30" diameter suitable for motors up to 350 h.p. D.C. (or A.C. with rectifier). Also available are Electro-Hydraulic and Hydraulic patterns.

Full particulars of these Brakes and other Igranic Electro-Magnetic devices can be obtained on application to Publicity Department, Bedford, or any branch office.

IGRANIC ELECTRIC CO. LTD.

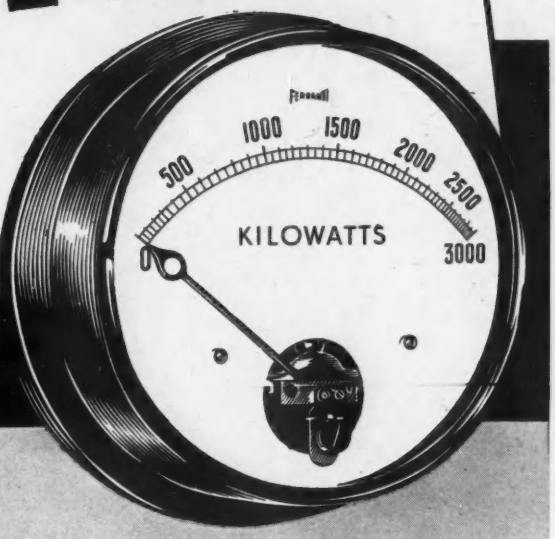
HEAD OFFICE AND WORKS BEDFORD

MOTOR IGRANIC CONTROL

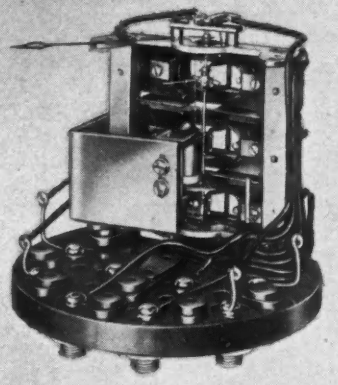
LONDON · BIRMINGHAM · BRISTOL · CARDIFF
GLASGOW · LEEDS · MANCHESTER · NEWCASTLE · SHEFFIELD

WATTMETERS

* New Design
* Compact
* Good Delivery



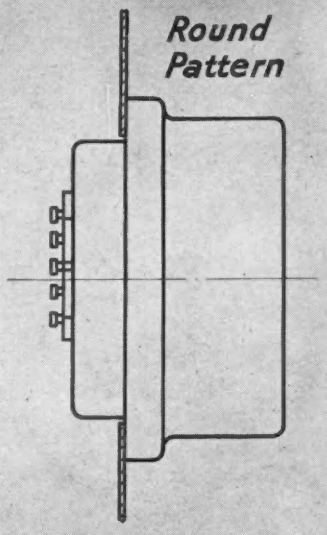
FERRANTI



Three-element movement for 3-phase 4-wire unbalanced load wattmeters

The illustration shows a 4″ dial 3-phase 4-wire unbalanced load dynamometer wattmeter with three elements. Shallow pressed steel case. Two or three elements for balanced or unbalanced load. Small V.A. burden. 4″, 6″ or 8″ round or square dial, semi-projecting or flush mounting. Other recently designed Ferranti instruments include ammeters, voltmeters, power factor meters and frequency meters. All types are also available in hermetically sealed cases.

Round Pattern



FERRANTI *Switchboard Instruments*

FERRANTI LTD · MOSTON · MANCHESTER

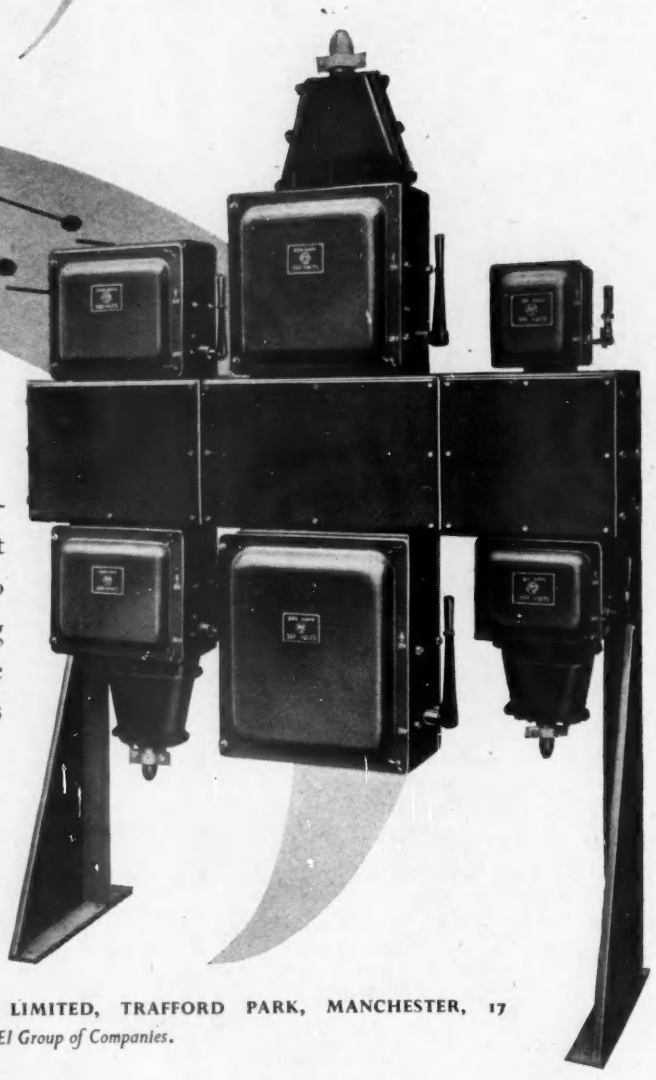
Head Office and Works: HOLLINWOOD · LANCS *London Office:* KERN HOUSE · KINGSWAY W.C.2

FI124

This means METROVICK Type MC fuse switchgear

- Flexibility
- Standard Unit Construction
- Easily Assembled
- 3 or 4-wire A.C.

up to 660 volts



Type MC Unit distribution boards are designed for controlling medium voltage power house and industrial systems. Their standard unit design means easy assembly with no drilling on site, and their sound engineering construction means a long trouble-free life. Full technical details and prices available on request.

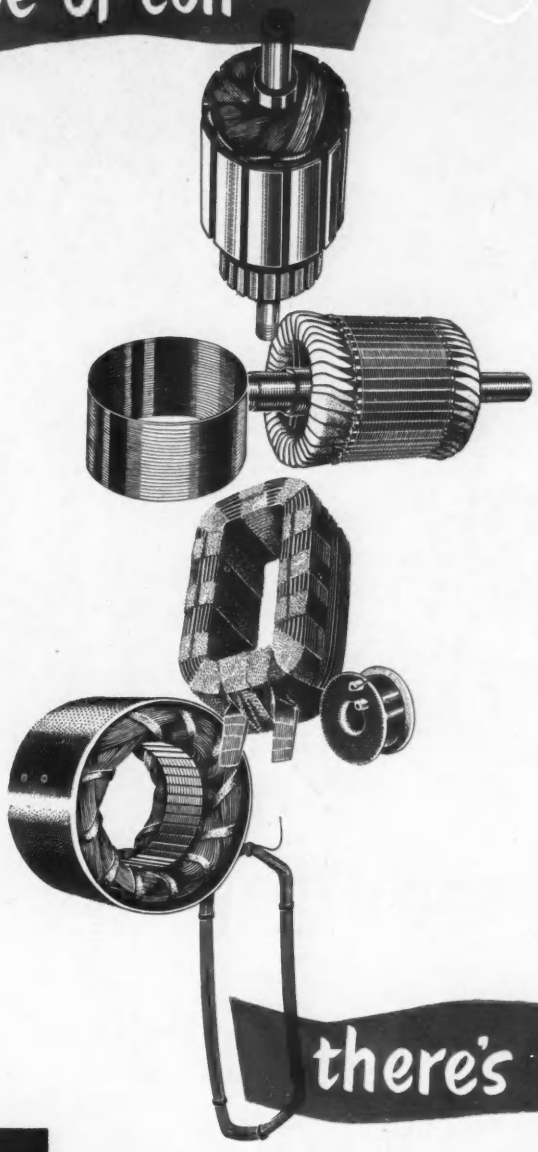
METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, TRAFFORD PARK, MANCHESTER, 17

Member of the AEI Group of Companies.

METROVICK *for all the Best in Switchgear*

F/V005

for every type of coil



there's a

BICC WINDING WIRE

USE OUR TECHNICAL ADVISORY SERVICE

If you are faced with a winding problem please ask for assistance; BICC technicians are always willing to give you the benefit of their experience. For most winding wire jobs the Publications listed will provide the data you require. They are available on request.

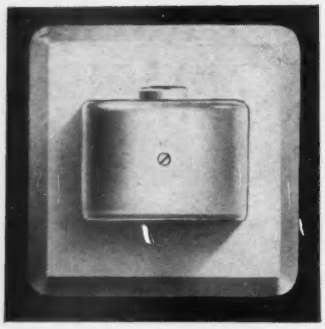
No. 266 *Insulated Winding Wires & Strips*
No. 296 *"Bicaloc" Winding Wires (Self Bonding)*
No. 303 *Enamelled Oil Base Winding Wires*
No. 322 *"Bicalex" Winding Wires (Synthetic Enamel)*
No. 328 *"Fifty-Three" Enamelled Winding Wires*

BRITISH INSULATED CALLENDER'S CABLES LIMITED

BI Callender's

21 BLOOMSBURY STREET, LONDON, W.C.1

Dignity



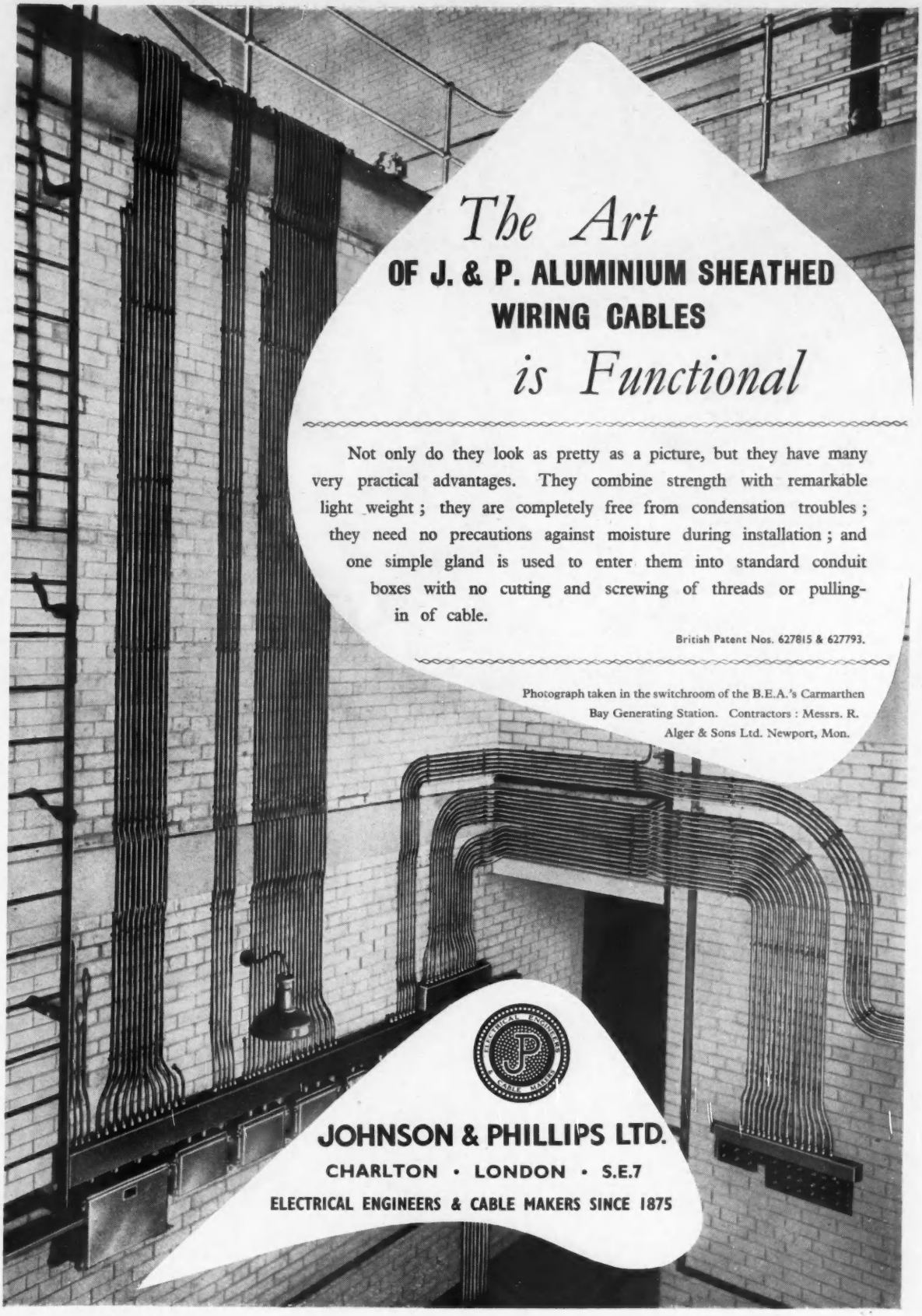
The simple, attractive design of Ediswan Surrey switches blends discreetly with gracious interiors of period or contemporary homes. These efficient switches with their unusual sliding—bar switch—action are being specified by discerning Architects everywhere. Send now for a catalogue and sample and see for yourself the advantages of the Surrey switch.

EDISWAN

RANGE OF ELECTRICAL ACCESSORIES

A catalogue and price list of the complete range of Ediswan Electrical accessories is available on request.

E31
THE EDISON SWAN ELECTRIC COMPANY LIMITED
155 Charing Cross Road, London, W.C.2, and branches. *Member of the A.E.I. Group of Companies*



The Art

OF J. & P. ALUMINIUM SHEATHED WIRING CABLES

is Functional

Not only do they look as pretty as a picture, but they have many very practical advantages. They combine strength with remarkable light weight; they are completely free from condensation troubles; they need no precautions against moisture during installation; and one simple gland is used to enter them into standard conduit boxes with no cutting and screwing of threads or pulling-in of cable.

British Patent Nos. 627815 & 627793.

Photograph taken in the switchroom of the B.E.A.'s Carmarthen Bay Generating Station. Contractors: Messrs. R. Alger & Sons Ltd. Newport, Mon.

JOHNSON & PHILLIPS LTD.

CHARLTON · LONDON · S.E.7

ELECTRICAL ENGINEERS & CABLE MAKERS SINCE 1875

12,500 HP (PEAK)

REVERSAL TIME

UNDER 2 SECS.

5,000 HP

G.E.C.

ROLLING MILL DRIVES

5000 h.p. motor (50 r.p.m. basic speed) driving a 42½" cogging mill in the Redbourn Works, Scunthorpe, of Richard Thomas & Baldwins Ltd.

THE GENERAL ELECTRIC CO. LTD · MAGNET HOUSE · KINGSWAY · LONDON · W.C.2

ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY, 11 FEBRUARY, 1954
Volume No. 125 Number 3249
REGISTERED AS A NEWSPAPER

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2.

Telephone: HOLborn 6016
Telegrams: Equivolt, Estrand

Editor and Managing Director:
ROY BALDWIN, M.I.E.E., Barrister-at-Law

Assistant Editors:
J. K. JOHNSON, B.SC.(ENG.), A.M.I.E.E.
K. C. POUNDS, B.SC.(ENG.), A.C.G.I., A.M.I.E.E.

In This Issue

Adamjee Jute Mills, by *H. M. Nimmo*, M.SC., B.E., A.M.I.E.E. 195
I.E.E. South Midland Dinner 201
Measuring Transformer Winding Resistances on Site 202
Self-Regulating Alternators 204
Readers' Views 205
Lively Debate on Scottish Bill 206
Notes on Wiring, by *Megohm* 207
A Planned Lighting Installation 208
Overseas News 210
Personalities in the Industry 212
British Standards 214
Problems and Practice in Engineering ... 215
Equipment for Industry 216
For the Electrical Trade 217
News of the Week 218
Questions in Parliament 222
Electric Supply News 223
Company Activities 224
Commercial Information 225
Classified Advertisements 43
Index to Advertisers 48

SUBSCRIPTION RATES

United Kingdom and Overseas £2. 10s. 0d. per annum. Canada $7.50, U.S.A. $7.50 per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies price 9d. each.

D

MEETING THE PEAK

The time is one for much back-slapping in the supply industry. A severe cold spell has been met and a record peak load carried by the Grid without load cuts even though there have been some adjustments on voltage and frequency. The B.E.A. has struggled out of their plant difficulties earlier than had been anticipated and, on this, all concerned deserve the country's congratulations. Not that there have been no anxious moments for control rooms and power stations; a near miss can be equally as trying as a decison to cut load. None the less, the public have had a convincing demonstration that the peak bogy is a thing of the past and we hope our friends of competing fuel industries will allow it to be placed in the proper place for time-worn bogies. The supply industry, however, is not yet free from concern; the accent has now swung from generation to distribution, for the number of outages due to distribution faults during the past weeks has reached serious proportions. This was not unexpected, indeed area board chairmen have been giving due warning of this for several years, because of restrictions on capital expenditure for mains reinforcement. Just as the limitations on power station building during the war was followed by the period of plant shortage, so this capital limitation is having its effects now in distribution failures. Perhaps more might have been done with the limited resources available but it is not always so easy to forecast the incidence of load growth as the actual increase itself. It is now the distribution engineer who takes the stage. His work, however, has not the glamour of the control room, his successes do not hit the headlines. Only blame for the breakdown is his lot, if anyone should be about on a cold winter's night to blame him.

COSTS ENCOURAGE CAPACITORS

One result of increases in the cost of electricity is that the number of installations in which attention to power factor improvement is worth while becomes steadily greater. Sometimes it is a desire to reduce kVA maximum demand charges that gives the impetus to install capacitors; in other cases the increasing cost of copper losses or the need to avoid the installation of additional cables may focus attention on the possibility of reducing current flow for a given power demand. But whatever the cause, as soon as the decision is taken to initiate a study of the possibilities, the question immediately arises, where in the system shall correction be applied? In most factories circumstances dictate the use of static capacitors rather than synchronous machines, but beyond this

point the choice is wide-open between large capacitors at substations, with a relatively low cost per kVA, but with less effect in reducing losses; and small capacitors deeper in the system, perhaps even one for each machine, that will automatically take account of the lagging demand to be corrected—but which will be costly in comparison with the centralised scheme. The solution, described on a later page, to the problem posed by the exceptional unit charge of 3¼d. met with in a Pakistan mill, is of interest as representing the extreme point that may be reached.

SAFETY BY LAW

Everyone is sympathetic to the need to reduce the number of accidents, in industry equally with those on the roads. Consequently the intent behind the "Safety in Employment Bill" introduced last week is assured of a kindly hearing even if some of its proposals may be subject to criticism. Briefly, it applies to all businesses with five or more insured persons and calls for the annual election by employees of one or more safety delegates with the duty of safeguarding their health and safety. In most large works safety officers already exist, appointed by the employers who naturally assure themselves of their fitness for the responsibilities undertaken. Whether a part-time delegate elected from amongst the employees will be equally effective is open to doubt. Such work requires a specialised knowledge of established safety techniques and of the likely causes of accidents, yet the Bill is strangely silent on any question of training; not even a pious hope is expressed that the delegates will be efficient in carrying out their duties. One has only to think of some of the intricacies involved in the safe usage of electricity to see the importance of proper education. Without this and in the absence of any sanctions against dereliction of duty, the whole proposal would be in danger of becoming little more than one more opportunity for form filling. No doubt it was considered that with the widespread application of the Bill to all firms with five or more employees it would not be possible to insist on adequate training but it might appear better to lower the sights and intensify the aim of effective accident prevention.

ELECTRICAL QUANTITIES IN BUILDING

Bills of quantities for buildings seldom go into much detail about electrical installations. As often as not the fully detailed list of prices for all aspects of building work are followed by a lump sum covering all specialist services, or at best a few prime costs, and provisional sums covering electrical work in very broad terms. Mr W. F. Parker took this point to some advantage in a paper he prepared a short while ago for presentation to architects and builders. His complaint that the sums of money intended for ill-defined electrical purposes are thus left for distribution by unqualified personnel is well justified by experience: there is, as he points out, the danger that they may be used to compensate increases in direct building costs by economy on services. More detailed bills of quantities for electrical and other specialist services could much improve matters in this respect, but they seem unlikely to become available until architects and quantity surveyors become better instructed on electrical installation matters. Perhaps more reasoned complaints from the electrical industry, on the lines of that made by Mr Parker, might shame them into improvement.

INFORMATION ON OVERLOADS

Temperature measurements on electrical machinery commonly cause the investigator some frustration, since his real interest is in the highest temperature reached by the insulation, while in fact he has to be content with some other figure which roughly approximates to the desired value. So far as large power transformers are concerned, the measurements by Dr Wilkinson and Mr Harmer, which they described in an I.E.E. paper last week, give a welcome and valuable check on methods more suited to everyday requirements. That the work should have been undertaken is symptomatic of the increased attention which is being given to overload characteristics in all branches of electrical equipment. The essentially arbitrary nature of the full load rating is being more clearly realised, and operators are becoming increasingly concerned with the effects of known past and probable future loads on the life of their equipment. Whether this will help directly in the operation of large transformers is by no means certain. None the less, the attention now being given to temperature variations caused by load changes is likely, in the long run, to bring about more economical plant design, and for that reason is worth while and welcome.

BOOKS FOR PRODUCTIVITY

How many of the medium-sized firms which make up so large a section of our country's industrial strength maintain even a modest reference library? An investigation some little while ago gave the expected answer—very few. Even when some nucleus of a collection exists, it is frequently locked-up, relatively inaccessible, in the office of the managing director or the chief engineer. The President of the Board of Trade, who had to answer a Parliamentary question on this subject last week, expressed himself as aware of the importance of technical libraries in industry; the British Productivity Council likewise explicitly recognises the need to encourage technical reading. These sentiments will have to be backed by more active propaganda than any we have seen yet, however, if much headway is to be made towards a greater use of recorded information. It is a common experience that firms which newly acquire a small reference library "wonder how they got on without it": an indication of how little those that remain bookless are likely to realise the handicap they are imposing on themselves. If other firms are willing to co-operate, then some system of pooling the technical books available in a locality, operated perhaps through the local public library as in a recent experiment at Acton, may prove the best method of persuading directors that some expenditure on books will pay dividends, but the accent should be on direct propaganda as part of the general drive to improve the average level of technical skill to the best.

Fluorescent lighting fittings are suspended from channel conduit in this view. The conduit is supported by a catenary wire

By H. M. NIMMO,
M.SC., B.E., A.M.I.E.E.

Adamjee Jute Mills

Full electrification is adopted for three new installations in Pakistan

WHEN on the 14th August, 1947, British India was divided into the two new states of India (or Bharat) and Pakistan, a most difficult situation confronted the jute industry, which had been the most valuable export business and one of the largest industries of undivided India. The greatest bulk of the raw materials of the industry was produced in what was now Pakistan, and especially were the better grades of raw jute obtainable only from Pakistan, while the whole of the mills and factories for processing the raw jute were situated in India, mostly around Calcutta. Trade between the two new countries was, from their inception, difficult because of the ill-will created first by the opponents of partition, exacerbated by the communal conflicts which followed immediately upon partition and caused substantial massacres in the Punjab and Bihar in 1947 and in Bengal in 1950, and kept alive by such unsettled problems as those of Kashmir and the irrigation of the Punjab. Finally, when Pakistan did not follow the action of the other members of the Commonwealth in devaluing her currency, India refused to acknowledge her right to do so and refused to recognise the new exchange rate so created, and trade between the two countries came to an abrupt end.

Pakistan Plans Mills

A considerable export trade in raw jute to countries other than India had always existed, Dundee being the biggest customer, but this was not sufficient to absorb anything like Pakistan's production of raw jute, and so the Pakistan Government decided to establish sufficient mills to absorb her non-exportable surplus of raw jute and it was decided in 1950 that mills should be built in East Pakistan to a total of 13,000 looms. Pakistan industrialists were invited to undertake the erection of these mills with government assistance up to 50 per cent, and the first of these projects to be set in motion was one for the creation of three mills, each of 1,000 looms by the Adamjees. The three Adamjee brothers are the sons of the late Sir Adamjee Hajee Dawood who was for many years a prominent figure in the jute trade in Calcutta.

Power Requirements and Provision

The site chosen for the mills is an area of about 220 acres in the Narayanganj area which is the traditional centre of the trade in raw jute, and is in the centre of the area of East Bengal which grows the highest class of raw jute. Electric power is required in fairly large quantities for jute processing, and it is reckoned that approximately 3 kW will be required for each loom in a mill of average distribution of output between sacking and hessian, sacking requiring rather more and hessian rather less than this average. This estimate is based on experience in Calcutta, where most of the mills are conversions from engine drives and employ group drives with large motors. It is suspected to be rather on the high side, since the ultra-modern equipment installed in the new mills will probably require rather less power than that in Calcutta, but this question will not be finally answered until the mills have been running long

These three illustrations show, left to right, an 8-way, 30-amp distribution board cabled with 0·01 sq in. paper insulated cables; a fuse-switch distribution board, to the left rear of which can be seen a bank of p.f. correction capacitors; and overhead bus-bars feeding spinning frames (left), and winders (right)

enough to have the workers sufficiently well trained to obtain the maximum possible output from the machinery. Jute machinery power requirement has a much larger factor dependent on output than has most other kinds of textile machinery.

Jute mills are good loads from the point of view of the supply authority since they produce a demand of a high load factor. There is very little difference between the peak load and the average load while the mill is running, and it is usual to run the mills for at least 16 hours a day, with probably a proportion of the mill running on the third shift as well, since it would not be possible to balance the machine layout to suit all possible combinations of output without having some of it idle for prolonged periods. For this reason the load factor of the power load will probably always exceed 55%. Lighting will, of course, affect the overall load factor adversely, but since the total lighting load on the mills will not exceed about 10% of the power load, and its average duration at full load will probably not exceed 6 hours a day, its effect is not very serious.

To take advantage of the large base load, approaching 10 MW, of these three mills, the Pakistan Central Government offered to provide power for the mills, and plans were made for the creation of a power station with an ultimate capacity of 40 MW, adjacent to the mill site at a village called Siddhirganj. This was initially to be a diesel station rated to produce 10 MW (later increased to 18 MW), and finally to be replaced by a steam station of 30 MW capacity, the diesel plant being then relegated to stand-by duty. This is a small station by European standards, but when it is realised that the largest existing power station in East Pakistan had a total installed capacity of 6 MW, it may be appreciated what a great advance was being made. The task of implementing these plans was passed over to the Government of East Bengal and it is much to be regretted that they had not found it possible to have any plant running in this Power Station up to the time the writer left in October 1953, though their plans were for it to go into operation in mid-1952, and the mills were in a position to absorb about 2,000 kW at the earlier and about 5,000 kW at the later of these dates.

Power in East Bengal must inevitably be fairly expensive. There is no local source of fuel; and coal imported from India under the various trade agreements which have been made between India and Pakistan since devaluation has never cost less than the equivalent of about £7 a ton, and at times as much as £10. 8s. a ton. In addition to this, the land in the vicinity of the rivers is typical delta, alluvial deposit, and the soil is of very low bearing capacity making building work abnormally costly. The land in many places is subject to inundation so that sites must be built up above flood level, which is again a costly procedure. The combination of high air temperature combined with high humidity virtually rules out cooling towers and so the selection of better sites remote from the rivers. With such a price for coal, and in view of the fact that it has a calorific value of only about 9,000 B.Th.U. per pound, it is more economical to burn fuel oil with double the calorific value at about £11 a ton. In these circumstances, also, the cost of power generation from diesel engines using light diesel oil at about £25 per ton looks much better than it would in this country.

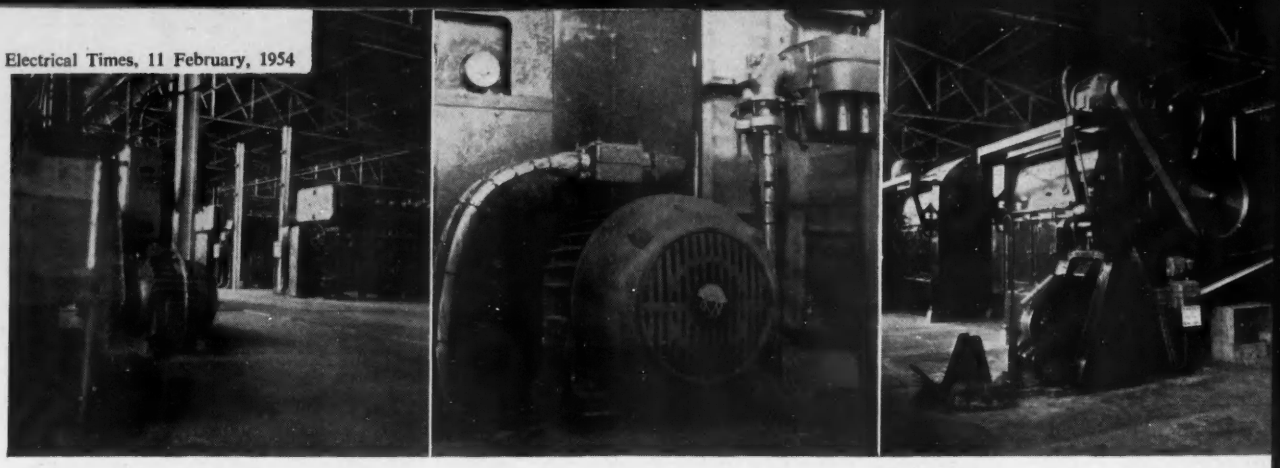
General Distribution Design

Largely because of the high fuel cost, but to some extent also on account of the high cost of civil engineering works, the Government has given as the cost of power to a bulk consumer supplied at high tension from this Station, the lump sum price of As2/- per kWh which is the equivalent of 3¼d. This excessively high cost for power has a very serious bearing on the design of the electrical system of the mills, since, with a high load factor as mentioned above, almost any extravagance in the use of copper, in the rating of transformers and in the correction of power factor can be economically justified. Unfortunately, this figure was first estimated as As 1/6 with diesel generation and A 1/- after two or three years with steam generation, and so the impact of this high power cost on the distribution system was not completely catered for.

Transformers and Switchgear

The supply to the mills from the Power Station was agreed to be provided at 11 kV by three 0·50 sq in. cables, and, the load requirement for each mill being estimated at 3,000 kW, it was decided that three 1,750 kVA transformers should be installed in each mill, two being on load at any time and the third arranged as a connected spare. Being in the immediate vicinity of a 40 MW station, and receiving generator bus-bar voltage, the size of the transformers was limited by the possible rupturing capacity of the secondary switchgear, and at the figure chosen for transformer rating, it was considered desirable to specify a reactance of 7% for the transformers. The secondary switchgear had to be arranged to prevent paralleling of any of the transformer secondaries and also to allow of the spare transformer taking the place of either of the others. This was achieved by concentrating the outgoing feeders at the ends of the board, and placing the three transformer switches at the centre. Interposed between the transformer switches, were two bus-section switches, and figure key interlocks were provided to prevent paralleling of any two transformers.

With a secondary current of approximately 2,400 amps at 420 volts, it was considered that the difficulties of ter-



From left to right: Cop winder motor and control panel showing cable connections; locally manufactured cable sealing box fitted to 15 h.p. motor driving spinning frame; finisher card drive, showing double cable connection between motor and control gear in armoured paper cable

minating so many large single cables (thermal considerations would have required 3—1·0 sq in. cables per phase) justified connecting these transformers to the switchgear by means of bare copper strip, and it was arranged that this strip should be mounted on porcelain insulators on the walls of the transformer cells. The whole of the insulators for the three mills were shipped from the U.K. in a single consignment, and, although safely landed at the port had completely disappeared by the time the shipment reached the mill site. This caused rather a headache, because these insulators were rather special and their delivery from makers protracted, and also the normal time for shipment from the U.K. was about four months from factory to site. It was therefore decided to manufacture something on site, and, as the workshop was at that time beginning to become useful, clamp type insulators were designed, using laminated plastic sheet $\frac{3}{4}$ in. thick which was imported by air-freight from U.K. The result was quite happy, and, although it had originally been proposed to close the clamp with a bronze cap, and this had been abandoned because it was impossible to obtain bronze for casting in East Pakistan, a sufficiently strong clamp was produced using a laminated plastic cap. Afterwards it was found possible to cast copper alloys since sufficient copper scrap from cable ends had accumulated, tin could be obtained locally, and zinc case linings provided that metal.

Transformer protection was confined to balanced current earth fault on the primary, induction type overcurrent on the primary with similar back up protection on the secondary, Buchholz double float protection and restricted earth fault on the secondary. Incidentally the restricted earth fault protection brought into prominence a curious feature of the fluorescent instant-start lighting system. By an oversight of the switchgear manufacturers, the neutral to earth current transformer had been balanced against three phase current transformers, instead of three phase and a neutral current transformers. In consequence the third harmonic current produced by some 700 small three phase transformers, star-star connected, produced a neutral current amounting to about 180 amps and this was sufficient to trip the restricted earth fault relay.

Power Factor Correction

With the very high cost of power, and operating for the long hours that these mills run, the cost of copper loss in the distribution system justifies the installation of sufficient static capacitors to correct the power factor to unity, provided the correction is applied sufficently deep in the system. There are however difficulties in correcting the power factor to unity, since, if sufficient capacitance to do so is installed and it is controlled by non-automatic switches, under certain conditions of loading the power factor may become leading. As is well known, when a system is operating with a leading power factor, disconnection of the supply may, under suitable conditions, produce an uncontrollable rise in voltage in rotating machinery, leading to failure of machine and control gear insulation. In a jute mill the necessary conditions may arise in the card section where the driven machines are of large inertia and the drop of speed on switching off power from them is very slow.

The best solution of this problem is to install an individual capacitor with each motor so that when a motor is stopped and the load reduced on the system, an equivalent amount of capacitance is also removed from the system; thus the overall power factor will remain reasonably constant. The objection to this solution is that the cost per kVA of installed capacitance rises very seriously when the motors become small, and there are many small motors in a jute mill. A compromise was therefore sought and the following general principles were evolved.

The system being, for reasons of convenience which will be discussed later, divided into nine main power circuits and the main circuits being divided into primary feeders, secondary feeders and final sub-circuits, it was found convenient to provide cables for the primary feeders of such size that they would be responsible for not more than 50% of the ohmic volt drop of the whole circuit, from main switchboard to motor terminals. The capacitors were then installed at the switchboards fed by the primary feeders, with one important exception. As will be seen later, some of the main circuits were distributed by means of overhead bus-bars and in these circuits it was possible to install the capacitors still deeper in the circuit by feeding them from the bus-bars themselves. This procedure has the additional advantage under conditions of more normal power cost, that it increases the power carrying capacity of the bus-bars. The final result, therefore, was that the power factor should be corrected to 0·97 lagging at what was assumed to be the normal operating load of the mill.

The capacitors ordered could be supplied from U.K. on quite a good delivery and were one of the earliest items delivered to site. They were in units ranging from 30 to 100 kVA and some of them played an interesting part in helping to solve a difficult problem in connection with the provision of power for construction purposes. Provision had early been made for the supply of temporary power by the installation of two portable International Harvester alternator sets from American Army disposals. These were said to be of 25 and 15 kW capacity, but were of course 220 volts, 60 c/s. This was obviously rather a difficulty, since all workshop plant was suitable for 400/440 volts, 50 c/s. One of the writer's earliest jobs was to obtain two 50 cycle 440 volt alternators which could be belt-driven from these engines. Two 25 kW generators

were obtained but on coming permanently to site in April 1951 it was found that the engines had a maximum rating of 30 h.p. and could not therefore be expected to develop more than about 16 kW continuously. At that time the load was about 20 kW and increasing all the time. Night construction work required a large number of high powered floodlights and a great number of general outside lights was required to circumvent the activities of dacoits and common sneak thieves who were prepared to risk life and liberty for the sake of a pound or so of brass, a bag of bolts or a coil of copper wire. It had been assumed that pulleys for these reconstituted generator sets could be made locally and Vee-belt pulleys were designed and an order was placed on the one engineering firm which appeared likely to be able to do the job. This order was placed in April and one of the two pairs of pulleys was delivered in October at which time the suppliers indicated their unwillingness to undertake production of the second pair. A design was therefore got out for a pulley with a hub consisting of a 3 in. square steel bar, two steel end plates, one to be welded to the boss, and a face of hardwood. Two such pulleys were successfully machined at a neighbouring shipyard, and the two belt driven alternators were put into commission in November.

Immediately a 440 volt 50 c/s supply was available the demand for power increased even more rapidly. It had been apparent for some considerable time that there would be a large increase in demand, and orders had been placed for three McLaren-Brush radiator cooled diesel sets amounting to 110 kW output, but these were still well ahead in delivery and it was decided to try and use one of the 50 h.p. slip-ring motors which had been delivered for loom drives as an asynchronous generator. There was a 40 h.p. single horizontal cylinder diesel engine and these two machines were coupled by a flat belt. It was apparent that the synchronous generators would not be capable of supplying the zero power factor exciting current for a 50 h.p. motor running as an asynchronous generator and so it would be necessary to connect simultaneously sufficient capacitance to supply the exciting current. It was found that 30 kVA was rather too little, but with 60 kVA the combination worked very satisfactorily and this set provided an extremely useful contribution to the power supply, just at the right moment.

Main Distributors

It has already been mentioned that nine feeders were used to supply the whole of the power load of the mill. This number of feeders gives 333 kW per feeder, or a current of 470 amp at 420 volts and power factor 0·97. This current allows feeders of a section of 2 x 0·25 sq in. for short runs without excessive volt drop, and 2 x 0·30 sq in. for longer runs. Cables of a greater section than this become difficult and costly in installation and the cost of providing isolating switches on the secondary switchboards increases very much out of proportion to the increase in power carrying capacity. It will be appreciated that the Indian Electricity Rules, which still run in Pakistan, demand that every electrical device shall be provided with an isolating switch "readily available," and this in practice means that all switch and fuseboards require to be provided with an incoming switch, which need not be automatic, but which must be able to break the normal current of the board and should, clearly, be capable of making against the maximum fault that the system can produce through it. After some experience of operating conditions in India and Pakistan, the writer is of the opinion that this provision is a wise one. Maintenance workmen are frequently only semi-literate even in their own language and danger boards on switches are often placed there illicitly and not removed when the necessity for them has ceased, so that they rapidly fall into disrepute, and there should be some device to enable a worker to protect himself.

The secondary distribution boards were of the unit type of switch-fuse boards with high rupturing capacity fuses built up as required by the demands of the subdistribution feeders to be fed from them. The requirements for such boards for use in the climate and under the conditions found here are firstly that the units should be rated for the high ambient temperatures found in the mills, which are appreciably in excess of the maximum shade temperatures found in Meterological tables. The insulating materials must be suitable for working under conditions of high humidity with freedom from flash-over and tracking, the construction should be as versatile as possible so that alterations and additions may be made easily. Circuit and isolating switches must be constructed in such a way that final breaking and initial making of circuits must be outside the control of the operator, since it seems impossible to train operators not to "dither" when closing switches especially if there is a flash on making. One further point which applies equally to all textile mills, is that the enclosures should be completely dust-tight.

Overhead Bus-bars

The secondary feeders taken from the secondary switchboards were also paper cable and fed either fuse distribution boards or overhead bus-bars and in the initial stages of the design it was necessary to determine the extent to which it would be economical to employ overhead bus-bars rather than fuse distribution boards for final distribution to motors. In an aircraft or motor car factory, where major changes of plant layout normally follow changes of design of the product, high recovery value of the electrical material is a factor of very considerable moment in the design of the distribution system, but it is not of anything like the same importance in a textile mill where the product is always substantially the same, and the machines have of themselves sufficient versatility to avoid major changes of layout over a vast range of product. The choice between overhead bus-bars and fuse distribution boards must therefore be made with reference to which of the systems involves the least operating cost per kilowatt distributed, taking into consideration overhead charges on the installed cost of the equipment, depreciation, interest on investment, and maintenance, together with cost of copper losses.

It seems impossible to arrive at a very satisfactory rule to cover all cases, but after having calculated a considerable number of installations, both in textile mills and other industrial undertakings, the author has come to the conclusion that if the possible load on an overhead bus-bar does not exceed 1 h.p. per foot run of bus-bar, then distribution by means of bus-bars is never justified; if the load on the overhead bus-bars exceeds 2 h.p. per foot, overhead bus-bars are always justified, and if the power requirement falls between these two limits it will be necessary to go through a rather involved and tedious calculation to decide which system should be employed. The result of the application of this rule to textile mills is that overhead bus-bar distribution can usually be justified for the spinning section of the mill and cannot be justified for the preparatory process drives of the mill.

This was found to be the case in these mills, where the spinning frames were arranged in three rows extending over almost the full width, nearly 700 feet, of the mill and a fourth row of cop and roll winders was installed extending over about 600 feet. The writer was, fortunately for himself, entrusted with the preparation of the final machine layouts for these mills and so was able to arrange that these

machines were installed with their drive ends adjacent in two pairs so that two runs of overhead bus-bar were sufficient to provide power for the four rows of machines, giving 2·55 connected h.p. per foot run of bus-bar as actually installed. It is worthy of note that the spinning and winding sections of a jute mill will absorb about 55% of the total power requirement of the mill.

Fuseboards

The final distribution in the preparatory and finishing sections was carried out by means of high rupturing capacity fuseboards of 30 and 60 amps per way. The functions of the fuses in these boards is fault protection only. Overload protection of the cable is inherent in the protection to the motor afforded by its control gear so long as the cable is adequate to take such load as the motor may normally impose on it. Overload in its normal sense cannot arise from a cable alone and the only overload that may affect the cable must be overload arising from the motor. In consequence there is no object in grading the fuses in a distribution board, except to the extent that they must afford some discrimination as against the fuse in the secondary distribution board feeding them. It is also most desirable that these fuses should be in no danger of rupturing on the starting currents of the motors and the principle adopted in practice was that all motors exceeding 7½ h.p. were connected to 60 amp boards and motors under this size to 30 amp boards and the fuses provided were everywhere the maximum that the board would allow, that is, 30 and 60 amps.

Final Sub-circuits

A further section of the system where a serious choice must be made is in the determination of what type of connection is to be employed in the final sub-circuits. The position with regard to this section is that firstly, in the high ambient temperatures found, rubber cables must be substantially derated resulting in very high costs for v.r.i. cables in conduit. Then, even allowing for the derating factor, the life of v.r.i. cables in conduit is short and may be assumed to be about 5 years. This is largely due to the high humidity, which will cause breakdown as soon as the first crack appears in the rubber insulation, whereas in a dry climate rubber cable will continue to function when all that remains of the insulation is a series of hard beads strung on the conductor. On the other hand, well terminated paper cable has a long life and a thermal rating considerably in excess of rubber cable since it can work at a considerably higher temperature. A further factor which will be of importance in those rather rare cases where the cost of copper loss has a serious bearing on the economics of the question, is that in small cables the cost increases very slowly with increasing copper section; and extra copper is usually available at negligible cost.

The result of these considerations is that, under these climatic conditions, the point at which it is economical to go from rubber cables to paper cables, is very low; when this was determined by the writer at the then existing prices for rubber cable, lead, copper and steel wire armouring, it indicated that the transition should occur at about the current of a 7½ h.p. motor. Unfortunately, the motors and control gear for this project had been ordered along with the process machinery before the writer joined the Company and would be arranged for conduit entry, so that it was reluctantly agreed that final sub-circuits should be connected with v.r.i. in conduit.

No steel conduit that could be supposed, by any stretch of the imagination, to conform to British Standards was available from stock or manufactured in Pakistan and early in 1951 the writer made a trip to U.K. by air to see if this, together with some other difficult items, could be obtained there. It was found that welded conduit could not be obtained in the quantities required under 11 months delivery; the only possibility was solid drawn conduit at a doubtful eight months, and, as neither of these deliveries suited production schedules in the very least, it was imme-

In the foreground of this view of the loom section is switch and control gear for the 50 h.p. motors driving the underground shafts of the looms

diately decided to connect all final sub-circuits in paper cable. This required a very large amount of reorganisation of orders which were already placed and in some cases completed, and visits had to be paid to machine manufacturers, suppliers of motors and control gear and cable makers to negotiate the necessary orders for these modifications. Motors were to be supplied by English Electric, Metropolitan-Vickers and the B.T.H. Company and a few by Brush Company; control gear by Geo. Ellison, Brookhirst and Igranic; and cables by Messrs. Edison Swan, and these companies co-operated to the fullest extent possible in the production of the necessary modifications.

It was found that the largest motor to be dealt with would be satisfactorily cabled with 0·01 sq in., 3-core cable and therefore, since so little was to be gained by using smaller sizes for smaller motors, it would be advantageous to use this size of cable to connect all the 1,500 or so motors which were covered by this change. At this time an order was placed for 17,000 yards of 0·01 sq in. p.i.l.c.s.w.a. 660 volt grade cable together with material for about 8,000 joints. Later a supplementary order for a further 8,000 yards of this cable was placed, but, owing to an anomoly of the Import Trade Control procedure, this had to be accepted as 0·0145 sq in., since paper cables under one-eightieth of a square inch required a special import licence.

Trouble soon arose with this switch-over from rubber to paper cable, firstly because the large number of cable boxes required could not be supplied by the motor and control gear makers as quickly as had been hoped. The makers of the distribution boards supplied cable boxes for them in good time, but when the starting date for the first mill was about six weeks ahead, the machine makers had supplied precisely none of the cable boxes that had been promised for the motors and control gear. At that time there was still no foundry on the mill site and very poor facilities available for founding outside. However, a design for a cable box was developed using such materials as were locally available, with a minimum of casting, and this was put into production at the neighbouring shipyard. There was no brass available, but plenty of lead scrap from cable joints on the larger cables, and so a lead cone type of sealing was used. The body of the cable box was made from 1½ in. galvanised iron pipe which, by welding, lent itself excellently to the production of right angle boxes and certain difficult boxes which required a double right angle bend. The armour clamp, the lead cone clamp and the fixing flanges were of cast iron but the amount of iron was kept to a minimum, as there were at that time practically no stocks in the country.

These makeshift cable boxes were used only in No. 1 Mill, since, by the time that cabling started in No. 2 Mill the supply of cable boxes was flowing well, but one machine manufacturer was unable to provide cable boxes for his spinning frame motors at all because the motors were tucked underneath the machines in a way that completely prevented the motor maker's standard boxes being used, and a second machine manufacturer supplied boxes which could not be fitted because they fouled a cover of the machine. Special purpose boxes were therefore designed for these machines; but, since at that time the foundry was in operation and brass could be cast as well as iron, a brass wiping gland was used on a split cast iron box and a much more pleasing design resulted.

Finally it should be mentioned in connection with all this cable work, that of all the cable joints made on this site by Pakistani jointers, including trifurcating and sleeve type through joints for 11 kV, in all amounting by now to five or six thousand, only about five were, to the writer's knowledge, found to be defective on test, and only one was known to fail in service. The writer has always been amazed at the high degree of technical ability attained by these cable jointers in a country where the general rule is that "just about" or as they say "near about" is generally considered near enough.

Illumination

With a power cost of 3¼d. per kWh there is no doubt that any system of lighting must be designed with a strong emphasis on minimum consumption of power and with a certain disregard of the initial capital cost. It is not surprising therefore that fluorescent lighting, with its high lumen per watt output, was chosen for the mill buildings. What was surprising to the writer was that the fibre experts were against the use of fluorescent lighting for the jute selection shed, where jute is blended before being put on to the machines. They agreed that fluorescent lighting was as near to natural light as it was possible to get, but explained their attitude by saying that jute grading was not reliable in good sunlight and that they actually preferred a low value of tungsten lamp illumination.

The intensity of illumination required for jute processing is not very high; the fibre is comparatively coarse and the yarn on the looms is light in colour and thicker and rougher than the yarn used in cotton weaving. The sections requiring the best illumination are the spinning section where a luminous intensity of 17 to 19 lumens per sq ft has been provided, and the weaving and sewing section where 13 to 15 lumens per sq ft was considered ample. The floor area of each of the buildings is approximately 500,000 sq ft and if the whole of the building were lit to what one would regard as a reasonable minimum level of illumination with the levels as given above in the more important areas, the recurrent expenditure for lighting, even with fluorescent lighting, would be very high and would represent an appreciable proportion of the whole cost of the product. A further point is that the building being of very great extent and small height, 13 ft to the roof truss, with many high machines preventing a general impression of the lighting being obtained, there would be no appreciation of the light and dark areas if varying intensities were used. It was therefore decided that high values of illumination should be used where specifically required and the illumination in areas where no work was performed would be allowed to drop to a minimum of 1½ lumens per sq ft.

On this principle, the total power requirement of each mill was approximately 250 kW and the installation consisted basically of 2,160 B.T.H. five foot 80 watt fluorescent lamps in single and twin reflector fittings and 30 B.T.H. 250 watt high pressure mercury discharge lamps in dispersive reflectors. The latter were used for the finished goods godown, which had a travelling crane and was 30 ft to the eves.

Inspection of jute mills in operation in Dundee with fluorescent lighting had indicated that there was no danger to be apprehended from stroboscopic effects with the machinery, but to guard against any possible danger on the spinning frames which were considered to be most liable to this effect, twin tube fittings with one of the tubes capacitor fed were installed there.

Lighting Installation

The electrical supply for the lighting installation was designed to be a separate one from the bus-bars of the main l.v. switchboard, and three main lighting feeders were run out to three 4-wire distribution fuseboards about the centreline of the mill. With a volt drop of about 3·5% on the transformer, it was necessary to design the lighting distribution system with a very small volt drop, and actually the volt drop to the last fitting on the 260 odd lighting circuits was calculated not to exceed 5 volts from the main

l.v. board. This involved the three main feeders being installed as 0·20 sq in. and some of the final sub-circuits being wired in 7/·036 conductor. The final circuits normally had 8 tubes switched together. In addition to this about three per cent of the tubes were wired on a single three-phase circuit direct from the l.v. switch room, to form a pilot lighting system for use when the mill was not working. B.T.H. industrial fluorescent reflector fittings were chosen, using the "instant start" system to eliminate one of the most frequent causes of trouble with fluorescent tubes, failure of the starter. This was extremely valuable in the early days of the installation when frequent overloading of the generating plant would cause low voltage which is one of the most destructive conditions that can afflict starters.

A serious problem arose in connection with the installation of this lighting system. It seemed impracticable to use anything but rubber cable for the final sub-circuits and it had been proposed to install v.r.i. cables in conduit. The amount of conduit required was about 250,000 feet. As has been already mentioned it was not found possible to obtain any conduit in U.K. (although about 8,000 feet of solid drawn was ordered as a speculation and eventually arrived), and so a search for a substitute commenced. Extruded aluminium ducting was considered but no guarantee could be given by anyone at that time that the amount of aluminium required—about 18 tons—would be made available by a specific date. Finally it was found that a small amount of 2 in. x 1 in. channel conduit was available and more would be forthcoming eventually. The amount was about 8,000 feet but this very small bird in the hand was better than turkeys in the bush and consideration was given to possible methods of utilising it. It was finally decided to suspend the channel conduit from a catenary wire strung in the steel work of the roof, and attach the fitting direct to it. The gear channel of the fitting was provided with two ½ in. clearance holes, and so two conduit bushes with locknuts would serve to attach the gear channel to the channel conduit and also allow the wiring easy entry. Stirrups were designed by the B.T.H. Lighting Department, and ordered, to support the channel from the catenary wire and in actual practice one of these stirrups was mounted at the end of each fitting and the rest of the channel conduit left to look after itself. The final result was a very pleasing one in appearance and the costs of erecting and wiring were remarkably low.

I.E.E. South Midland Centre Dinner

Electrical Engineers should Publicise their Profession

FULL House was the order of the day when the South Midland Centre of the I.E.E. held its annual dinner at the Grand Hotel, Birmingham, on Friday last, under the Chairmanship of Mr H. J. Gibson. The very large attendance of members and guests had their attention held by an admirable set of speeches, of which the first was delivered by the Chairman himself, in proposing the toast, "The City of Birmingham." In the course of his remarks on this subject, Mr Gibson recalled that the 23,000 new houses built by the Corporation since 1945 had all been supplied by the electricity board, and as many more existing houses as well. A number of consumers, equivalent to 15% of those existing in 1945, had been connected since that date.

Mr Gibson went on to suggest that the Corporation, when planning smokeless zones would realise that whenever any solid fuel is burnt on a grate, acid is sent out to the atmosphere which would do more damage than any smoke or smut. In the course of his witty reply Ald A. Paddon Smith, who deputised for the Lord Mayor of Birmingham, suggested that collieries were the greatest local culprits in the matter of emitting smoke to the atmosphere. In another context, speaking about the replanning of the centre of Birmingham, he called for the erection of multi-storey garages.

Mr F. J. Errol, M.P., proposed the toast "The Institution of Electrical Engineers," and stressed the world-wide nature of the Institution, as it had been made apparent to him in his travels in the East. The Institution, he felt, was an organisation offering friendship and camaraderie as well as technical studies.

He went on to say that there were three members of the Institution in the House of Commons—two Tory and one Labour. This was useful, for from time to time the House had to discuss electricity. The electrical engineering profession, he felt, needed more boys leaving school, and to help obtain them members of the industry must not be shy in telling others about what was being done in engineering: the information must be spread in every way that was possible.

Finally, he suggested that the dinner was an appropriate occasion to congratulate the B.E.A. and the Area Boards on the wonderful work they had done in coming through the cold spell without power cuts. Although the Authority and the boards all worked as a team, the efforts of the administrators, accountants and secretaries would have been of no use in this respect without the skill of the Chartered Electrical Engineer.

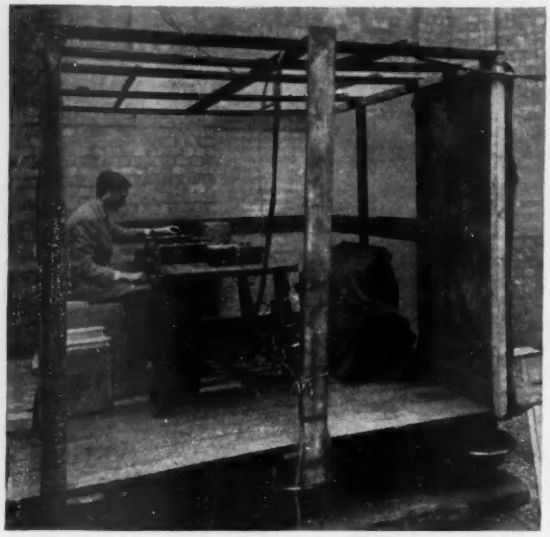
The country was feeling the benefit of the modern large scale plant which had been installed in power stations. This provides an example of what could be achieved by large scale capital investments.

Publicity for Engineering

Replying to this toast was Mr H. Bishop, President of the I.E.E., who recalled that the South Midland Centre contained within its boundaries nearly 10% of the total membership of the I.E.E. He agreed with Mr Errol that electrical engineering was insufficiently in the public eye It was noticeable as well, that there were insufficient boys entering the profession to meet its needs. Quantity was not the only problem: he thought the profession was not getting its fair share of the quality of school leavers. This might be accounted for by many reasons, such as the shortage of physics masters in schools, but it certainly needed combating, and the three Institutions were working closely together on the problem. The electrical engineer had got to be a better disciple in his own cause and there was a job here for every member to do.

Mr Bishop went on to say that it was astonishing how much has to be done by the Institution on a world basis. It was fascinating to see how much influence the I.E.E. had on world affairs.

When Mr Bishop had finished his speech, which also included a reference to the consideration being given to re-arranging the form of the I.E.E. Journal, Mr A. R. Blandford, Senior Vice-Chairman of the Centre, proposed "Guests and Kindred Societies." To this toast, the Rt Rev The Lord Bishop of Birmingham made a consistently witty reply that provided an excellent conclusion to a successful and generally enjoyed evening.



Measuring Transformer Winding Resistance on Site

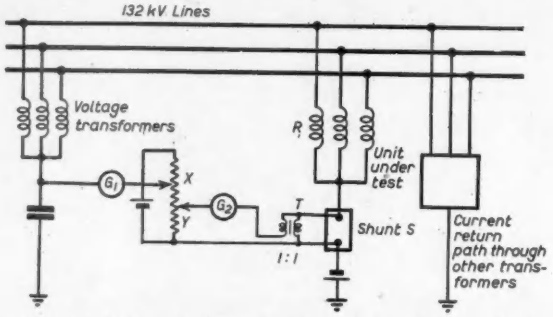
I.E.E. Measurements Section discuss direct voltage injection method

TO obtain flexibility in the use of a power distribution system it is essential to know at any instant the load carrying capacity of each component. Where transformers are concerned, the greatest load is set by the temperature allowed in the hottest part of the insulation, and hence depends upon the recent load history of the unit. An estimation of the temperature of oil insulation is given by adding to the mean winding temperature half the difference in temperature between the oil at the bottom and the top of the transformer tank. Oil temperatures may be comparatively easily determined but measurement of the winding temperature offers greater difficulty.

Although the method involving extrapolation from winding resistance measurements taken at known periods after the unit has been isolated from the system is standard practice, being referred to in B.S. 171, it has the disadvantage that appreciable temperature changes are likely to take place in the interval between isolating the unit and taking the measurement. Considerable attention has therefore been given to methods in which measurements can be made whilst the transformer is in service, and the first experiments of this nature to be made in the U.K. received an appreciative welcome when they were described in an I.E.E. paper read to a joint meeting of the Supply and Measurements Sections last week. The technique used by the authors, K. J. R. Wilkinson, D.SC., M.I.E.E., and J. D. Harmer, B.SC., GRAD.I.E.E., is that in which a small direct current is added to the alternating load current in star-wound transformers. The voltage corresponding to this current is measured whilst the transformer remains in service and on load.

Four Problems Involved

The unit selected was the No. 4, 60 MVA, 132 kV transformer at Ironbridge substation. In making the measurements, four problems had to be overcome—injection of a direct current of a few amps; its measurement in the presence of an alternating load current likely to be as high as 330 amps in each winding; the measurement of a continuous potential of about 2 V on the h.v. terminals in the combined presence of 76 kV at power frequency and random system fluctuations; and comparison of this potential with the injected d.c. to present the desired resistance. Considering the four aspects separately, injection was accomplished by inserting a d.c.

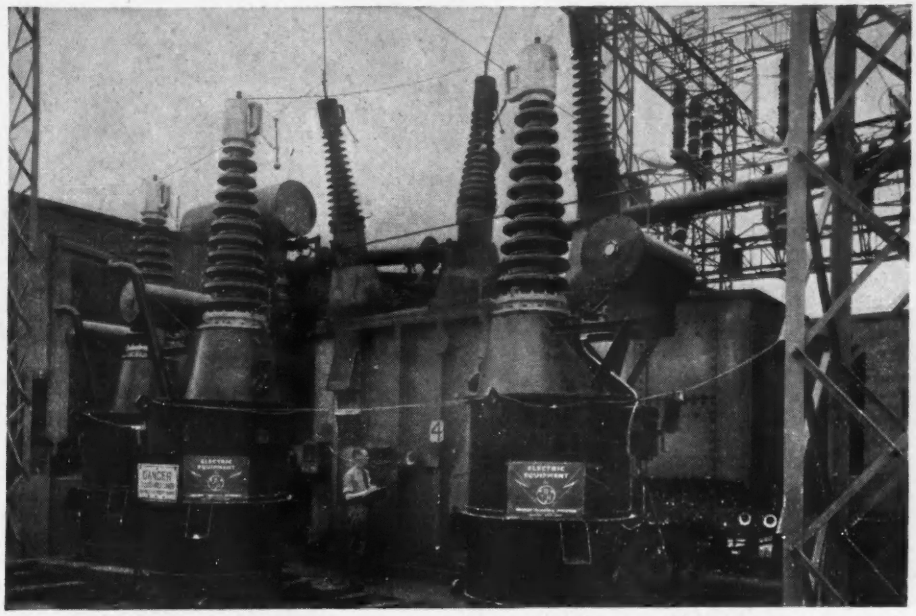


A simplified diagram of the measuring circuit and (above, left) the hut in which measurements were carried out, showing the means by which it was insulated from ground

source between the neutral of the transformer and earth, other power transformers in the system acting as a return path. To obtain high sensitivity measurements, the injected current should be as large as possible, but a limit is set by the tendency of this current to bias the core flux, driving the peaks into saturation and thereby causing excessive iron loss. An upper limit of 3 amps was finally accepted, supplied by passing a current from a 6-V battery through a 0·03 ohm resistor connected between the neutral and earth.

By inserting a shunt in each star connection of the transformer the direct current in each winding was measured, whilst a fourth shunt was also placed in the neutral to earth connection to measure all three windings in parallel. The accompanying sketch illustrating the principle of the measurements shows only the neutral shunt. Alternating load current in each winding shunt causes an a.c. voltage to be established across it, superimposed upon the direct potential, but this can be removed from the measurement by the use of a 1:1 transformer with a reversed, or bucking, secondary winding.

The most difficult problem, however, was presented by the measurement of the continuous potential of some 2 V established across the transformer windings. This was partly solved by the use of a low-pass filter LC, comprising the primary winding L of a voltage transformer in series with a capacitor C, as shown in the diagram. The magnetising current of L was small, which, in com-



The No. 4, 60 MVA transformer at Ironbridge, showing the equipment attached to it for measurements

bination with a sufficiently large value for C reduced the alternating voltage to a few volts. The remainder appearing across C was removed by the use of another bucking transformer (not shown in the sketch). Although this arrangement successfully eliminated the power frequency voltage, random fluctuations, manifesting themselves as potentials of 2 or 3 V at frequencies of about 1 c/s were still combined with the direct voltage. It was then necessary to enhance the time-constant of the filter with a single valve stage, which reduced the cut-off frequency to 0·002 c/s and eliminated most of these random fluctuations.

For comparison of the two measurements, the effective bridge circuit, shown in the sketch, compared the resistance of the transformer windings with those of the shunts in two steps, making use of two null-reading galvanometers. Of these, G_1 enabled the continuous voltage on each high voltage terminal to be copied, whilst G_2 acted as a bridge galvanometer, the circuit making allowance for shunt lead resistances and the effective load of the transformer T.

In preparation for the tests, the transformer had been given three bushings to enable the neutral connection to be made outside the tank, whilst a frame had also been fitted to carry the injecting resistor, shunts and other equipment. As the measuring components would rise to some 100 V above zero in the event of an earth fault, with a further possibility of rising to 1,000 V (the breakdown voltage of the spark gaps), all components were located on an insulated platform.

Winding resistances were measured at intervals throughout a series of controlled changes in load from 100 to 140% full load. Due to the precautions outlined above, and favourable system conditions at Ironbridge, the sensitivity of the measurements was within 1% (3° C.) for the three phases in parallel, and twice this value for individual phases, disturbances being less troublesome when measuring the combined resistance. Analysis of results shows a probable accuracy, for this condition, of 1% whereas for the three phases individually it nears 2·5%.

Results also show that the hot spot temperature obtained from the mean winding temperature plus half the difference between top and bottom oil temperatures is in close accord with that given in the conventional manner using a hot spot indicator. Moreover, the records give evidence by which the temperature cooling rule given in B.S. 171 can be checked, good agreement being reached between experimental and calculated figures. This agreement was substantiated by other measurements made during tests on a 120 MVA, 275/132 kV auto-transformer.

DISCUSSION

MR G. B. HARPER (B.E.A.) said that Ironbridge was a particularly suitable site as it was possible to get a degree of control on the load to permit of readings being taken. There were also facilities for putting in the extra equipment that was needed. Then again the transformer was suitable for the inclusion of the shunts in the neutral end of the phase winding. However, the authors had proved that one shunt in the neutral served the purpose just as well. It was difficult in practice to achieve readings within a four-minute period, especially on a large transformer, as there was not time to make the necessary corrections and get adequate readings. One had then to try to make corrections for shut down which might or might not be accurate. The authors' method would be of great assistance in enabling thermal problems to be more accurately appreciated.

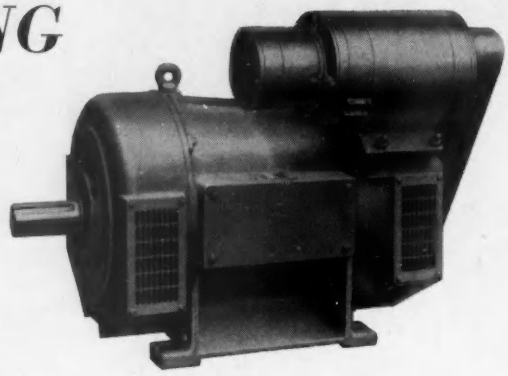
MR L. SMITH (British Electric Transformer Co.) said he believed winding temperature indicators of the phantom type to be very desirable and useful devices. He felt bound, in the interests of accuracy, to point out that they had snags. The chief point in mentioning these snags was to establish that a phantom hottest-spot device was an indicator rather than a measuring instrument. One must therefore be prepared to accept discrepancies from the real hottest-spot temperatures which the authors had not measured.

MR M. WATERS (E.R.A.) said that E.R.A. had had to adopt the same technique as the authors in investigating thermal conditions inside their small 100 kV transformers. The real nigger in the woodpile seemed to be variations from the power supply superimposed at very low frequency. If measurements had been taken across the lines there might have been less variation. The measurement of temperature by a rise of resistance was, he thought, very important.

MR F. H. E. MYERS thought more attention should be devoted to the user's point of view. The temperature allowance was, he thought, very conservative. If so, the transformer might be allowed to go a little higher in temperature. The result might be a considerable increase in output at less capital cost if these temperature-measuring devices were used.

MR D. P. SAYERS (B.E.A.) thought Mr Myers had struck the right note. He hoped the transformer experts would not regard this development as a piece of measurement only but would consider the implications for users. All the evidence suggested that the design of British transformers was on an extremely conservative basis.

SELF-REGULATING ALTERNATORS



Amplidex control system has high speed response

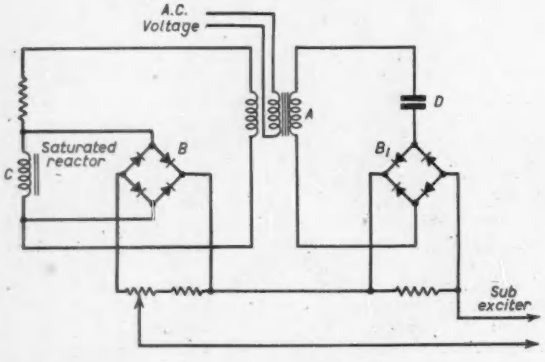
THE self-regulating alternator driven by an independent petrol or diesel engine is an attractive proposition for power supply in remote areas, where mains power is not yet available and where it is desired to use standard a.c. appliances. One of the necessities of such plant is that it shall require the minimum amount of maintenance and attention. Bearing this in mind, the Brush Electrical Engineering Co., have produced the "Amplidex" control system, which is compact and static and can be fitted to an alternator of standard and well-proven construction.

The system requires main and pilot exciters, which as can be seen from the illustration, are mounted on the side of the alternator and are belt driven from the shaft. These machines are built in tandem and have fully laminated fields to ensure quick response. The pilot exciter draws its own excitation current from the control unit. Compensating windings have also been introduced into the exciter unit to enable it to operate with comparatively high armature loading and to provide rapid response. This compensating winding has in addition the faculty of ensuring good commutation during the "field-forcing" required to restore the alternator voltage quickly on rapid changes of load. To ensure that on maximum recovery rate, the system remains stable a damping circuit is included.

Voltage Control

Operation of the voltage control unit can be explained by reference to the diagram. The alternator voltage is fed through an isolating transformer (A) to two bridge rectifiers (B, B_1) one of which is shunted by a saturated reactor (C) and the other having a series capacitor (D). The outputs from the rectifiers are applied to two resistances in series, and the difference in voltage across these two resistances, provides an error signal which controls the pilot exciter. A small rheostat is provided to set the alternator voltage to its required value.

Basic circuit diagram of control unit



The saturated reactor holds the output voltage constant for one rectifier, but the output voltage of the other varies in direct proportion to the alternator voltage. When the two voltages are equal, no control current will be supplied to the exciter. If the alternator voltage varies the exciter field current will vary in magnitude depending on the strength and direction of error signal, thereby correcting the terminal voltage to its set value.

The reference voltage provided by the saturated reactor is sensitive to frequency, but so also is the current in the capacitor fed by the rectifier. These two effects are mutually self-cancelling, and in fact no difference due to frequency changes is experienced.

Over the normal range of engine governing the balance point will remain unchanged; in fact the frequency can be adjusted from 50 to 60 c/s with only a small change in terminal voltage arising as a consequence.

Characteristics

Brush self-regulating alternators with Amplidex control give a voltage regulation of ±2½% from cold to hot—at variable power factors—no load to full load—allowing for the usual 4% engine speed variation. When full load at 0·8 p.f. is thrown off, the voltage rise is arrested in less than 0·2 of a second and the voltage overshoot is within 20% of normal voltage. Throwing off full load at unity power factor is less onerous, and very little disturbance of the voltage occurs. Conditions for throwing on load are similar and voltage variations occur of the same order. Within the limit of full-rated kVA, voltage recovery is obtained in one second or less for any condition of load change. The machines are also capable of taking heavy load surges with a minimum voltage disturbance and without loss of control.

The system will operate over a wide voltage range such as 380-440 volts and frequency range of 50-60 c/s. If necessary a series-parallel station connection may be provided to give dual voltage when required. In this case the connections to the control circuit remain unchanged, so that both voltage ranges are covered by the same rheostat. This scheme permits delivery of full rated output at either voltage. A further advantage is that the self-regulating alternators will operate satisfactorily in parallel with alternators with excitation controlled by more normal types of automatic voltage regulators.

READERS' VIEWS

Correspondents writing under a pseudonym are asked to submit their names in confidence to the Editor

Status of the Engineer

IN your issue of 28th January, Mr A. M. F. Palmer reveals a misapprehension about the true nature and function of the Engineers' Guild. For many years there has been widespread dissatisfaction amongst professional engineers that all is not well with our profession: the proliferation of specialist bodies, both learned and protective; the lack of kinship between practitioners of different specialisms; the inadequate acknowledgement by the community of their invaluable skills and knowledge—all these are painfully familiar to us all. To effect the remedy will require many years of patient plodding effort. The remedy, moreover, cannot be achieved by concentration upon sectional claims for improvements in salaries and conditions of employment. It can only be reached by bringing unity to a badly fragmented profession, by the development of those attributes which characterise a mature profession—professional competence, altruistic public usefulness, good citizenship, leadership in the community—and by protection in the meantime of material reward and professional status.

There is only one organisation appropriately constituted to do these things, and that is the Engineers' Guild. It is the only association devoted solely and exclusively to chartered civil, mechanical and electrical engineers. It is not a trade union, and hence is unencumbered by the legal requirement of placing considerations of remuneration in the forefront of its activities. It transcends, but does not neglect, local self-interest. It covers exactly the same body of persons as the three senior engineering Institutions, and while they deal with engineering, it deals with engineers.

There are several trade unions doing excellent work for professional engineers in certain sections of engineering. Long may they continue to do so. But, despite their excellence, they can never do for the profession what the Engineers' Guild can do, i.e. put the whole profession "on the map" in the eyes of the community. Thus when comparing the Engineers' Guild and the Trade Unions, it is not the similarities which are important, it is the differences. Once these are properly appreciated, surely the most ardent trade unionist must give the Guild his support.

J. W. H. Turner,

SECRETARY, ENGINEERS' GUILD.
LONDON, S.W.1.

* * *

THE most interesting point from Mr Palmer's recent letter, is the admission that "on the Joint Board the Electrical Power Engineers' Association is the only employee organisation represented."

While not necessarily supporting the claims of any other organisation in particular, I feel it is time the fact that those who, for any reason, do not belong to or agree with the E.P.E.A. are not represented on the Joint Board at all was more generally realised.

A more democratic approach to the constitution of the Joint Board is long overdue.

A. L. Snave.

SURREY.

For the Female of the Species . . .!

During the past few weeks, a few letters have been published in "The Times," complaining of—or defending—the quality of present-day domestic electrical appliances. Here our correspondent advances—with considerable temerity—a possible reason for breakdowns.

THE correspondence columns
Of *The Times* newspaper
Are moaning about the ephemeral,
Luckless, incompetent existences
Of Household Electrical Appliances.
Holding as I do no brief
For any Electrical Manufacturer
I feel that much of the blame
For the insidious, insistent disorders
Of these domestic toys should lie
Upon the parties in whose hands
The beastly things break down—
The WOMEN OF THE HOUSE.

Writing as a thrice-married
And doubly-daughtered man
With half a lifetime's experience
Of Generals, Cooks, Companions,
Parlourmaids, Norlanders, Governesses,
Fräulein, Demoiselles, Chars, Helps
And (now) Dailies, on the one hand,
And Housemen, Boot-boys, Gardeners,
Chefs, Valets, Batmen, Odd-jobsters,
And Cooks'-Husbands, on the other,
I assert that in general
The spindle side is completely
Incompetent to maintain
Even a pair of scissors.

When the gadgets are in service
The Man of the House is occupied
Elsewhere; it is not for him to see
The electric iron as it falls
From the rickety board; the plug
Dragged by its cable from the socket;
The loose nut that is never tightened,
(Indeed over and above an active
Desire to avert dissolution,
SHE would have to possess
A confident persuasion as to which
Way to turn the godless thing),
The twists and knots, tied and pulled,
Into the living body of the flex;
The banging, the overloading; the neglect
To fill, the omission to empty;
The timely stitch omitted;
The relegation to wet, or dusty,
Or ill-conceived storage spaces . . . .

Usually in the placid course
Of the wonted evening meal
Paterfamilias is told "Oh, by the way,
The X HAS GONE WRONG."
Search for more and better detail
Evokes the information that
IT WON'T GO
IT SUDDENLY STOPPED
IT STARTED TO SMELL
OUGHT IT TO SMOKE
IT SEEMS TO RATTLE
And so at too-late last, the hulk
Secures the male's minimal attention.

(In younger, more hopeful days,
I have taken an inoperative
Appliance right down to its elements
And having re-assembled it,
Making all fast and pretty,
Ship-shape and Bristol fashion,
I have believed it to be in trim
To endure the mishandling
Of any malevolent male monster;
But these precautions did not work out
In the soft hands of the gentle sex;
Give the doo-hickey six short months,
Then wear-and-tear, moth, rust,
Brutality, corruption, misuse,
And disuse will have broken it
UP, DOWN, and THROUGH.)

In this technical age we need
A new definition of endurance;
It suffices not for a fangle
To be FOOLPROOF; for security
Against FOLLY is a myopic aim;
Pace the Electrical Association for Women,
We need a new B.o.T. classification
"HUSSIF-PROOF."
And lest my proposal should fail
For lack of an apt proving-ground
I am ready to throw open
My very ordinary household
For the appropriate testing period.

Makers of Electrical Appliances, be contented;
You shall yet see justice done.

John Hanchard Goodwin,
LONDON, S.W.3.

Lively Debate on Scottish Bill

THE Electricity Reorganisation (Scotland) Bill was debated in the House of Commons on Wednesday, last week. After a spirited debate, the House divided, and, by 30 votes the Bill was given a second reading.

An outline of the Bill was given by the Secretary of State for Scotland in the opening address. Existing arrangements and the wishes of many people in Scotland had been reviewed, he said, and as a result this step was being taken to restore management of her own affairs to Scotland. It was a measure of decentralisation. The North of Scotland Board was to remain unchanged by the Bill, but three factors would affect them. Mr Stuart said the Board would be appointed by himself only. Approval for constructional schemes would not have to be obtained from the B.E.A.; and thirdly, the new Southern Board would replace the B.E.A. as the body required to purchase electricity produced in the north. Later he said certain links with England would remain, although little power crossed the Border now either way.

In the matter of staff pensions and safety measures, responsibility would rest jointly with the Secretary of State and M. of F., but the certification of meters would be left entirely to the latter. Mr Stuart also stated that he was prepared to consider proposals concerning the principle of national negotiations on labour problems in the Committee stage. It was proposed, he said, to introduce a Measure consolidating the electricity code applying to Scotland, as soon as possible after the passage of this Bill.

Mr A. Palmer was not complimentary in his remarks on the Bill. It was, he said, a classic example of unnecessary legislation, giving no practical advantage to Scottish consumers. It set back the clock on progressive development and asked for its withdrawal. He said it was ironical that while links between England and France were being drawn closer, those between England and Scotland were being severed. In addition, the Bill was viewed with the greatest concern by trade unions. Whilst not opposed to revisions, Mr Palmer said they should be consistent, and made after full consideration. He recalled the Ridley Committee's recommendation for securing effective and co-ordinated development of the nation's fuel and power industries.

In favour of the Bill was Sir Arnold Gridley, mainly because of his belief that the authority operating power stations should own and control them. Mistake of the 1947 Act, he said, was to give the B.E.A. control of power stations. He recalled that the old Central Electricity Board could determine how stations were operated, and although not the owner, could, if a breakdown occurred in Glasgow, instruct Leeds to send load north. Sir Arnold pointed out also that no Area Board knew now until the end of the year, what it had to pay for units bought from stations.

In the course of the debate Mr A. Woodburn expressed doubt as to the real purpose of the Bill, and Mr G. Nabarro said he would be more pleased with a single authority for the whole of Scotland. Mr J. Taylor wanted to know about costs in the immediate future. South Scotland needed more generating capacity, but if Scottish consumers were to bear the burden, the ultimate aim of everyone in Britain paying the same per unit, would disappear, he said. Mr H. McNeil asserted that all on his side of the House would vote against the Bill.

Replying to the debate, Mr Henderson Stewart dealt first with Edinburgh's £1m asset taken over in 1947. He pointed out that financial settlements between the new Board and the B.E.A. could not be made until the new Board existed, and would have to take into account financial positions of the parties in April 1955. On the formation of executives Mr Stewart said subsidiary executives would be established in Edinburgh and Glasgow. These were two districts with unique peculiarities and the solution was thought to be most advantageous in all aspects. Turning to the matter of the trade unions, he explained that at present sole responsibility for seeking consultation lay with the B.E.A. If the North and South of Scotland Boards were to be independent, there was little sense in their being subject to a decision from estranged London. Other points from this closing speech were that the possibility of changing the name of the B.E.A. might be considered in the Committee stage; and, finally, Mr Stewart declined to confirm that the B.E.A. approved the Bill.

notes on wiring

by Megohm

WHERE conduits are run in wall chases the normal practice is to install galvanised conduit and accessories; this is regarded as a safeguard against deterioration of the conduit and subsequent damage to the conductors. I have always arranged for this to be done on jobs for which I have been responsible, taking care to ensure that exposed threads and couplers are carefully coated with suitable paint and that any abrasions on the outside of the conduit are protected in the same way.

I was therefore rather surprised to learn that an engineer in authority had rejected this practice and insisted that all conduits in such positions be of the enamelled type, thoroughly coated with red oxide in their entirety. The conduits were specified to be securely fixed and a coat of neat cement floated over them.

The reasons given for this break from the general practice were that it would cut the cost of the work and that it was not always possible to ascertain if the damage on the galvanised conduit had, in fact, been completely covered by the paint. Looking at this matter from the contractor's point of view, it seems to me that very little reduction in cost can be made and so there will be no saving to pass on to the client. The time taken to paint the conduit and let it dry before fixing, and the fact that the installation and fixing cannot be completed in one operation, must surely cancel out the difference in cost of the two types of conduit.

It also appears to me that the red oxide could easily be scratched off by the conduit slipping over the surface of the chase whilst being fixed into position. If this is so, then the purpose of the coating is defeated.

I have access to a site where a new installation is being carried out under the supervision of the engineer in question, so I am hoping to learn some more of his side of the argument. In the meantime, I wonder if any readers who have had experience of both these methods, can confirm that my theory is correct, or is the use of enamelled conduit treated as described, indeed an answer to the problem of keeping installation costs to a minimum?

Earth Wires to Motors

The question of bonding which I discussed recently will bear further examination. For final connections to motors it is usual to use metallic flexible conduit in order to allow for movement of the motor on the slide rails for drive adjustment. It is also helpful with regard to minimising vibration on the conduit and any possible transmission of noise from the motor. This flexible conduit must not be relied upon as an earth conductor, and an earth wire should always be provided from the solid conduit system to the motor. Since, however, not every motor manufacturer provides a suitable earthing terminal on his motors, the earth wire must either be connected to the holding-down bolt or to the terminal box bolt.

The question arises in such cases where an earth wire is used, should it be installed inside or outside the flexible conduit. Resident Engineers differ on this point, and some insist that the earth wire be installed as they wish. The opposing reasons they advance are of some interest.

The method of installing the earth wire inside the flexible conduit undoubtedly saves mechanical damage to the earth wire itself and avoids the need for earthing clips. The earth wire can be neatly bonded to the conduit system by means of a bolt inside or outside an adjacent conduit box. It is sometimes necessary to bring the earth out of the flexible conduit at the motor end, but this can be conveniently arranged by drilling the conduit gland. Some engineers feel, however, that with this method the cables serving the motor can be damaged by the bare earth wire being pulled in with the cables. They argue that a "visible" earth does give a clear indication that all is well as far as earthing is concerned.

In the case of the earth wire being run outside the flexible conduit, the first objection is the danger of mechanical damage by someone pulling the wire, treading on it, or even cutting it to use it for some other purpose. There is also danger of deterioration, through continuous contact with a concrete floor or water. In certain situations, the atmospheric conditions could seriously affect both the earth wire and the necessary earth clips. There is, however, the fact that the earth wire is visible to be considered, and this to many people is quite an important factor. The earth wire can, of course, be securely fastened to the flexible conduit to guard against mechanical damage.

Having the earth wire installed inside the flexible conduit undoubetdly makes a neat job, and the earth wire can be carefully brought out into view at either end, and the earth terminal in each case placed in a position where it can be easily inspected.

Parallel Earth Situations

Some comments in these notes recently on the Code of Practice for "Farm and Horticultural Electrical Installations" made reference to the precautions regarding parallel earth situations. They brought me the story of an incident which occurred in the house of a friend and is, I think, worthy of mention.

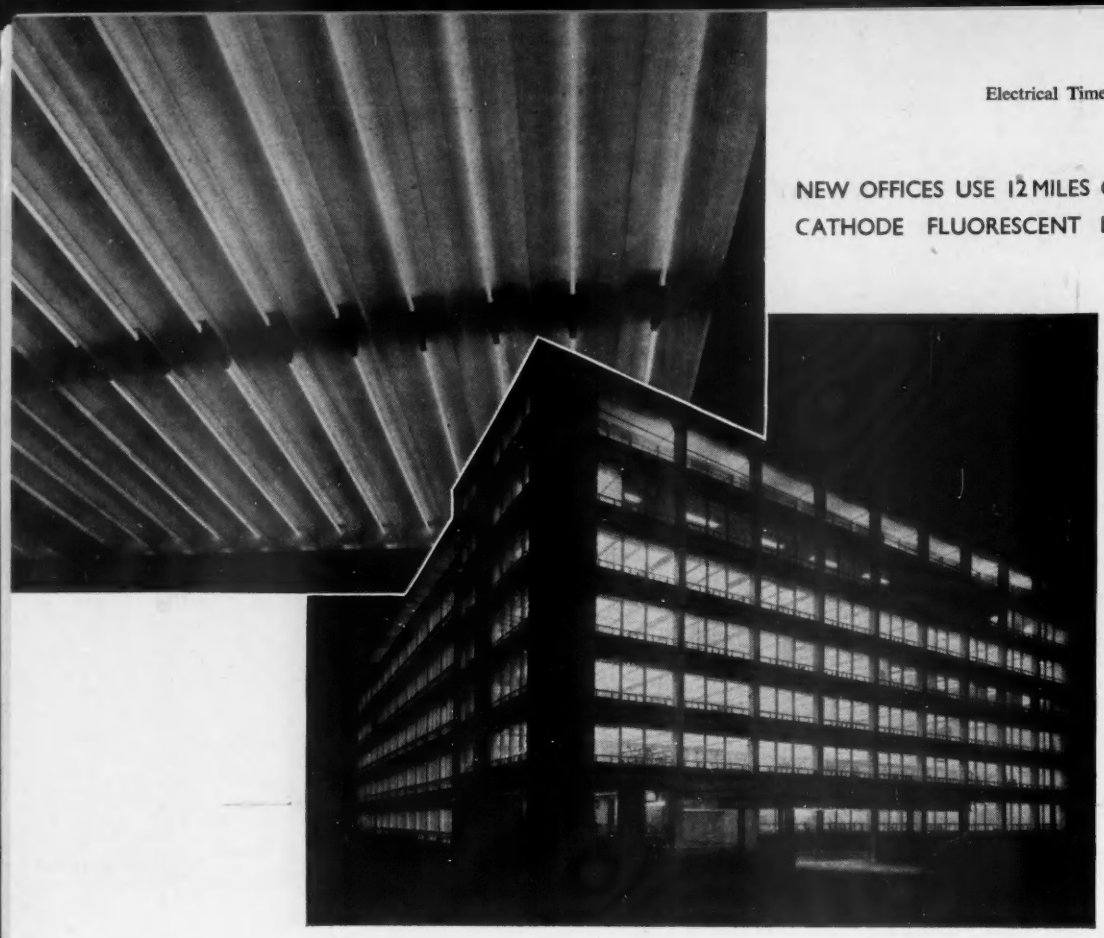
A fault developed on the cooker in the house and as, unfortunately, the earth-leakage circuit-breaker did not operate, severe damage to the cooker resulted. On investigation the e.l.c.b. was found to be badly damaged. The coil was completely burnt out and the adjacent mechanism damaged.

It appeared, at first, that the damage had been caused through non-operation of the mechanism and that this was due to no test having been made for a long period. However, after a discussion on the matter, the possibility of the damage resulting from lightning was put forward. No one recalled this happening, but some thought on the problem produced the casual remark that a flash of lightning had, some months previously, damaged the telephone in the house.

On looking at the position where the telephone cable entered the house, it was noticed that the telephone earth electrode was sited a distance of only twelve feet from the earth electrode of the electric wiring installation. The whole incident appears to emphasise the necessity for the careful planning of earth electrodes.

Electrical Times, 11 February, 1954

NEW OFFICES USE 12 MILES OF COLD CATHODE FLUORESCENT LIGHTING



A planned lighting installation

IMMEDIATELY following the war, it became evident that both on the administrative and the manufacturing side, considerable improvement and extension was required at the Heaton Works of C. A. Parsons and Co., Ltd. It was, however, decided at that time, that in view of necessity for immediate production, concentration should be placed on the reconstruction of the works, and that the rebuilding of the research, technical, administrative and accounting sections should be held up. It was not, therefore, until 1950 that a decision was made to go ahead with the final preparations of a scheme for a new building.

The site chosen lay at the west end of the works, occupied previously by the "top shop" established originally in 1889 when Sir Charles Parsons started Heaton Works, and the original office buildings. The new building takes the form of an "L" of which the long leg is 311 ft long forming a west frontage and the short leg 183 ft forming a south frontage set some 40 ft back from Shields Road.

The long wing is devoted to research laboratories and technical offices, and six floors were found necessary in this section. In general these floors are completely open and obtain adequate daylight from large windows on both sides, internal corridors being reduced to a minimum. The width between outer walls is 62 ft, the floor to ceiling height being 12 ft 6 in.

Design and administrative departments are housed in the south wing and here the floor to ceiling height has been reduced to 9 ft 3 in., permitting the introduction of an extra floor. The two wings are linked at the south-west corner by an oblong shaped hall, common to all floors and off which are located the lift installations, main stairway and toilet accommodation. Secondary staircases and lifts are provided at the extreme north end of the west wing and at the east end of the south wing.

Five vertical brickwork service shafts extend the full height of the building and carry inlet and extract air to all floors together with plumbing, electrical and other services. These include the low pressure circulated water system from calorifiers provided with primary heat from the works boiler system. Three different methods of heating are used. The first, installed throughout the building with the exception of halls, corridors, luncheon rooms, kitchen and lavatories, was adopted because of the extensive recessed ceiling lighting. This heating system consists of continuous fabricated grids of 1 in. square steel pipes to which the continuous rows of perforated, anodised-aluminium inverted troughing, semi-elliptical in shape are attached. The second method also uses a pipe grid, but for lighting rectangular anodised plate reflectors are installed. This system is used in halls, corridors and luncheon rooms. In kitchens, lavatories and stairways the normal type of embedded heating panels are installed.

Planning the Lighting

In planning the lighting installation it was decided not only to provide the high average service illumination of 60 lumens per sq ft over large areas of floor space, but to evolve a scheme specially adapted to the needs of a building where, by an effect of perspective, the size of many offices would give a false impression of low

ceiling height if normal ceiling mounted fittings were used.

The question of a suitable lighting system was studied in the earliest stages of planning the building. In collaboration with the departments of C. A. Parsons and Co., Ltd., responsible for the architectural design of the building, the General Electric Co., Ltd., prepared a scheme for embodying cold cathode tubes in the ceiling construction in such a way that over the greater part of their area the ceilings themselves would appear to be sources of light. This has been achieved by means of rows of reflectors which form the underside of the surface of the ceiling, and run at right angles to the normal direction of view from the office desks and drawing boards so that the tubes themselves are normally concealed. The reflectors, which as mentioned before are clipped to the rectangular hot water pipes in the ceilings, are 9 ft long.

Ceiling Lights

Close attention was given to the optical design of the reflectors to avoid a harsh shadow at their longitudinal junctions. As a result there is nothing to give a definite impression of where the ceiling begins, and this absence of a firm indication is effective in preventing an impression of a low ceiling even when looking down the whole length of such a large room at the main drawing office which is 216 ft long by 60 ft wide. The colour of the lighting was studied in great detail, using alternative types of tube, before the choice of "Intermediate" was made.

The whole lighting installation in the building incorporates some 7,000 Osram Intermediate White cold-cathode tubes, with a combined length of about 12 miles. Acoustic panels form the ceiling at the ends of, and between, the areas of continuous lighting and the transformers are concealed above. Four tubes are operated from each transformer. The maximum width of continuously lighted areas is 28 ft (three tubes end to end). In the spaces between these areas the acoustic panelling is interrupted at intervals by laylights with tubes above which are used as pilot lights.

Switching is normally automatic under photo-electric control, which first switches on the tubes in the central areas, and then those near the windows. The main switching is performed by G.E.C. 23-amp, 4-pole contactors.

In the entrance hall there is a portrait of Sir Charles Parsons and showcases containing some historic models made in the course of his early experiments. Here the lighting is by cold-cathode tubes installed above 20 laylights. All corridors are normally illuminated by "spill" lighting from offices through glass partitions, but are provided with laylights for use as pilot lights when the office lighting is extinguished. Staircases are lit by lines of cold-cathode tubes behind glazed panels on the landings.

The interior lighting, seen through the almost unbroken areas of window, makes the building conspicuous at night, and added interest is given to the frontage by 85 watt sodium floodlights on the top balcony, and three 400 watt mercury units in the forecourt.

The success of this noteworthy installation emphasises the importance in major schemes of this kind, of lighting being included in the planning from the earliest stages.

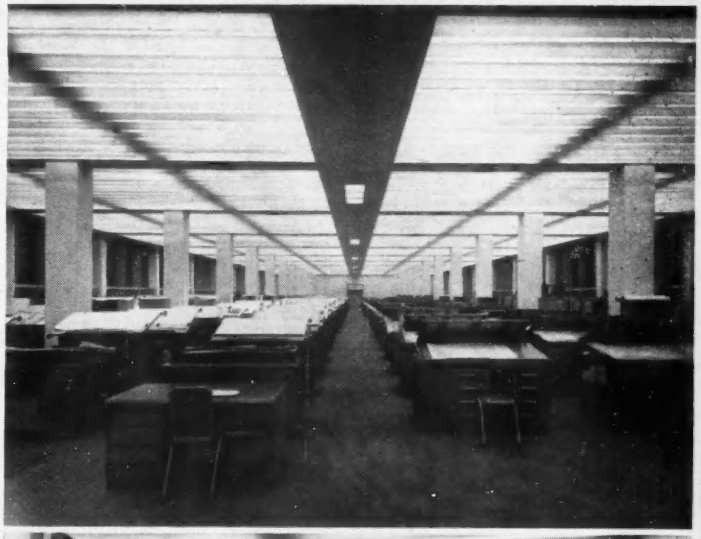
An unusual feature of the building, certainly for this country, is the use of paternoster lifts. Three of these are installed, each consisting of fourteen open-fronted cars, and each car is capable of accommodating two persons. They travel in a single brick shaft, separated in the centre into up and down shafts by vertical timber guides. The cars are suspended at diagonally opposite corners on two endless chain drives operated by equipment in the plant chamber above, and move up and down the shafts at a speed of approximately 80 ft per minute.

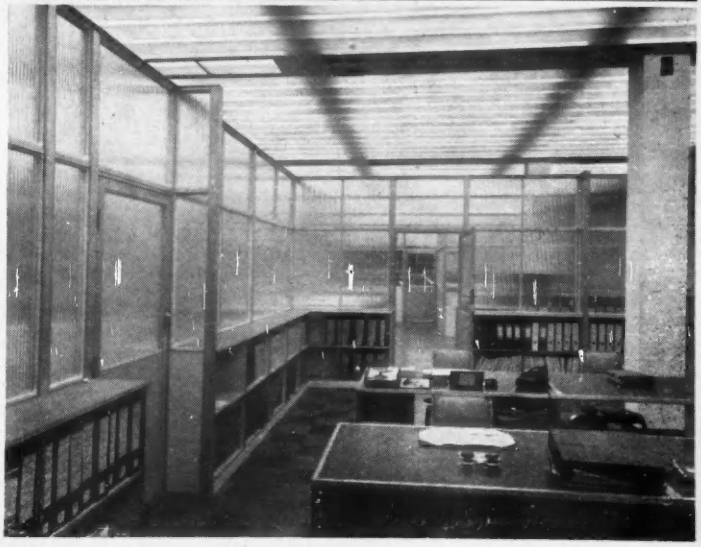
E

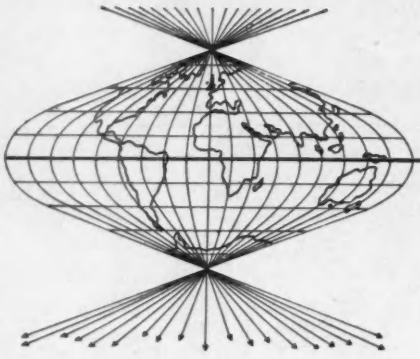
Top: The entrance hall lighted by cold cathode tubes above laylights

Centre: The "luminated" ceiling in the main drawing office

Base: Typical arrangement of lighting on a floor sub-divided into small offices







OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

Underground News

The date has now been fixed for the inauguration of Canada's first underground railway—the Yonge Street system in Toronto. It is 30 Mar. By that time 94 of the 104 cars ordered from British manufacturers will have been delivered.

We also have news that members of Montreal City Council are urging that a subway should be constructed in that city this year. The Montreal Transportation Commission has already prepared a report recommending construction of a 7·78 mile stretch of underground railway at an estimated cost of $117 millions. The City Council has asked its executive committee to study that report and put forward its recommendations.

Submarine Cable Order

The order, valued at over $3 millions, placed by the British Columbia Electric Co., with British Insulated Callender's Cables Ltd., of which we gave the first news last week, is for the supply and installation of some 77 miles of their 138 kV gas-pressure type cable. As we stated, this cable is to be laid across the Georgia Strait from a point south of Vancouver on the mainland to a spot south of Nanaimo on Vancouver Island. The anticipated route includes continuous lengths of cables, each about 17 miles, laid under water at depths up to 600 ft. Four single-core cables will be required —3 for regular use and one in reserve— the circuit being able to transmit approximately 150,000 h.p. The cable will be of the gas-pressure type with a hollow copper conductor, pre-impregnated insulation, lead-alloy sheath, with special anti-corrosive protection and armouring. It is planned to have the power scheme in operation in 1956. The British Columbia Electric Co. anticipate that this new connection will enable them to meet Vancouver Island's power needs for the next 10 to 12 years, when additional cables could be laid to complete a second circuit of similar capacity.

New Offer to Winnipeg

Winnipeg is once again the centre of discussion concerning its electricity supply system. This time, the Manitoba Government has offered to make the City Council's Hydro the sole agency for power distribution in Winnipeg. If the City Council agrees it will have to purchase the distribution system of the Winnipeg Electric Co. within the city. That company, acquired by the Province a year ago, is now wholly owned by the Manitoba Hydro Electric Board as agent for the Province. This proposal has been put to the City Council by Premier Campbell in a letter in which he states that the Government has decided to transfer the retail sale and distribution of electricity to another provincial body, the Manitoba Power Commission. The Manitoba Hydro Electric Board is to be confined to the production of electric power and the Power Commission to the distribution side, apart from Winnipeg itself, if the Council agrees. In his offer to the City Council, Premier Campbell says the Government is prepared to enter into negotiations without requiring that a transfer of ownership of the City Hydro Electric system generating plants is necessarily included in any such arrangements. (The City Council now operates hydro-electric plants at Pointe du Bois and Slave Falls on the Winnipeg River.)

U.S.A.

The 50 Millionth Consumer

The U.S.A. now has 50 million electricity consumers. Having reached that impressive milestone the electricity supply industry claims that 98% of America's population is now connected to its power lines. During 1953 a total of 513,000 million units were generated—some 4½ times the output of 1929. Generating capacity was also increased by 9,200 MW last year, and there is now a 17% nation-wide average margin of generating capacity over demand, compared with a 10% margin in 1950. Furthermore, it is claimed that although the United States has less than 7% of the world's population, it produces approximately 42% of the world's electricity.

Seaway Bill Progress

The St. Lawrence Seaway project has passed another hurdle in its U.S. political battle—the House of Representatives Public Works Committee has agreed to the Bill by 23 votes to six. The Bill, authorising the U.S. to co-operate with Canada in building the Seaway was slightly amended by the Committee. It now proposes setting up a new Government agency, the St. Lawrence Seaway Development Corporation, to represent the U.S. in all its undertakings in the project with Canada. The Bill now goes to the House Rules Committee for the vote that would release it to the floor of the House.

EUROPE

Swiss Power Output

During the year ended 30 Sept. last, the Swiss electricity supply industry continued to develop satisfactorily. The last report shows that expansion is now becoming normal after the heavy increases of the previous two years and this tendency continues. Overall, 10,201 million units were sold for internal consumption during the twelve months, showing an increase of 3·1% as against 4·8% for the previous year. The classes of user showing the greatest increase in demand was the domestic and small industrial consumer with 8·2%. Normal industrial and railway usage remained practically unchanged, but in the chemical and heavy industry a drop of 5·2% occurred. An increase, however, took place in the summer export of power. Despite the fact that the basic needs of industry and the domestic load can now be met, even during dry years, it is still necessary to continue with projected schemes, and it is estimated that the output of hydro-power will, by 1961/62, have reached about 17·6 million units per annum, of which 8·3 million will be winter power.

AFRICA

Awaiting the Volta Report

It is expected that the preparatory commission investigating the Volta River hydro-electric scheme, on the Gold Coast, will be able to report on the technical and feasibility of the project before the end of this year, Sir Charles Noble Arden-Clarke, the Governor, stated in the Legislative Assembly recently. The hydro-electric scheme, as originally suggested, would be an integral part of an aluminium production project, about the economic feasibility of which some doubts were recently expressed.

INDIA

States' Joint Scheme

Engineers of Andhra and Hyderabad States have been meeting in the preparation of a joint scheme for the execution of the Rs. 36 crore Nandikonda project. The scheme envisages the construction of a 400 ft high dam across the Krishna River at Nandikonda. About 70,000 acres of land in Telengana and 130,000 acres in Andhra will be irrigated while the total power generated will be more than 100,000 kW. We understand that Andhra engineers have already prepared the complete scheme and it has received the tentative proposal of Hyderabad engineers. At the present meetings a formal agreement to share water and power resources and the cost of the project will be entered into.

Views on Power Development

The technical committee convened by India's Planning Commission is now examining arguments which are likely to have far-reaching effects in regard to that country's future generating capacity. In a nutshell the question is—which should come first, the demand for electricity or its generation? Primarily the matter affects in the first instance the Bhakra-Nangal project. One group advocates an imaginative approach while another recommends caution, it seems. The main doubt of those advocating the go-slow policy rests on the painfully slow growth of demand attending the 33,000 kW Jogindarnagar hydro-electric scheme. They contend that generation of large quantities of power in advance of the estimated load will entail additional initial expenditure and the burden of interest charges. In their view it is undesirable to install further generating sets. The other school holds that the only sure method of creating demand is to put power on transmission lines. The experience of other countries is freely quoted by both sides. One group says that India, with her non-mechanised way of living, will never be a consumer of electricity on a par with Western countries. Hence the load growth will be slow. The other group, while agreeing to some extent, maintains that with mechanisation and industrialisation, India's utilisation of hydro-electric power will increase similarly. For this reason, 125,000 kW of power by 1960-61 is not regarded by them as too large a quantity to produce on the Bhakra Dam. This, they say, will start an era of positive availability of electricity at a rate within the ordinary citizen's means.

MALAYA

Demand Increasing in Malaya

Operation of the first stage of the Connaught Bridge power station of the Central Electricity Board of Malaya, which started up some months ago, has brought a rapid increase in demand for power in the region. In the Kuala Lumpur area alone a further 669 new consumers were connected to the Board's mains in the month of October. There is also a heavy demand for ceiling fans in the towns, caused by the many new government quarters and private houses being completed. An average of 150 hired ceiling fans have been installed each month for some months now. The Board's hire purchase scheme, with terms extending over three years, is also being utilised to a greater extent by consumers, most types of appliances from refrigerators and air conditioning plants to hair-dryers and waffle irons being obtainable under the scheme. To further encourage the greater use of electricity, the Board recently held an Electrical Exhibition in Johore Bahru, and similar exhibitions are to be held in other districts.

AUSTRALIA

Cable Factory Nearly Ready

The 1,000 ft long main manufactory building of Fairfield Cable Pty. Ltd., is now nearing completion at Fairfield, New South Wales. This new Australian cable and wire manufacturing concern, jointly owned by W. T. Henley's Telegraph Works Co., Ltd., Enfield Cable Ltd. and London Electric Wire Co. and Smiths Ltd., is establishing its new factory on a 30-acre site where there is ample room for expansion. Mr Alan Maughan, chairman of the company, has said that production at the factory might start about the middle of this year, and would be steadily expanded as tooling-up was completed. When the factory was in full production, it would no longer be necessary for Australia to import wires and cables from overseas, he added.

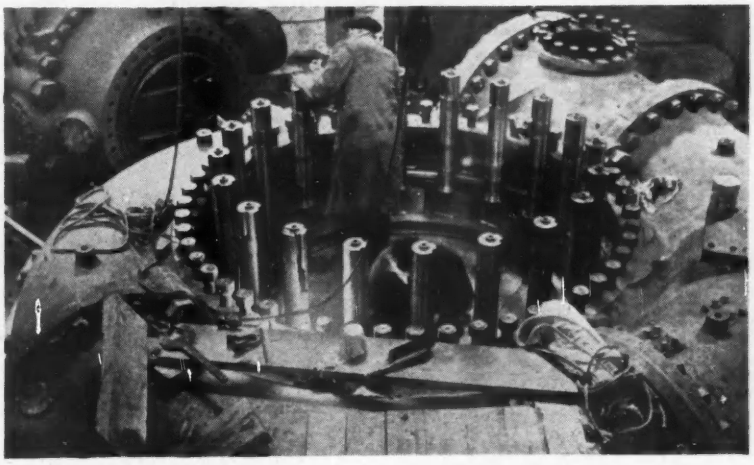
Work at Port Augusta

Construction work is to begin this year on the second power station to be built at Port Augusta for the Electricity Trust of South Australia, Mr R. H. M. Lea, general manager of the Trust has announced. The artificial island site of the first power station, now under construction, will be extended to accommodate the second station. At the first station, the initial 30 MW turbo-alternator is now being installed and it is expected to be in operation in June. The second should be put into commission later this year, and a third 30 MW set will follow.

NEW ZEALAND

A Democratic System ?

Either by accident or design, New Zealand has evolved what is probably the most perfect democratic system of electricity supply in an imperfect world. That is one of the conclusions formed by Mr C. M. Gray, chief engineer to the Waitemata Electric Power Board, as the result of his recent overseas tour of investigation. Reporting on his mission at a board meeting Mr Gray said that if a consumer in New Zealand was burdened with a sense of injustice, he could appeal to the board member for the district who would make the complaint known to the executive staff of the board. Under the nationalised system in Britain, the consumer had no right of direct access to the controlling authority. Although he agreed that he was somewhat critical of the supply organisation in Britain, he admitted that they had got over the shortage of generating plant very remarkably in the last few years.



Work on the erection of a Boving water turbine at Tungatinah power station, Tasmania. This is one of five vertical Francis turbines ordered by the Hydro-Electric Commission of Tasmania, three of which have been placed in service during the past six months. The fourth machine, now being erected, should be running towards the middle of this year. Each turbine is rated at 35,000 h.p. and runs at 600 r.p.m. under a net head of 950 ft. Incidentally, this is the highest head Francis turbine yet installed in Australasia. Our photograph shows the cast steel spiral casing with the 48 in. diameter rotary type inlet valve in the background. The guide vanes are being set to the correct position

Personalities

IN THE INDUSTRY

Formerly with the sales department of the head office of the Rheostatic Co., Ltd., **Mr D. R. Pigot** has left to take up an appointment as manager of the Johannesburg sales office of that firm's subsidiary company in South Africa, Contactor (Pty.) Ltd. Mr Pigot received his engineering training at Faraday House after service in the Royal Navy, was for some time with the Iraq Petroleum Co., and later the Electrical Apparatus Co. He joined the Rheostatic Co. in 1949 and for three years specialised in the design of unbreakable resistances. The Rheostatic Co. also announce that **Mr J. M. McKenna,** formerly in the Head Office Sales Department, has been appointed sales engineer to their Northern area office at Manchester. Mr McKenna was also trained at Faraday House, and served with the English Electric Co. before joining Rheostatic in 1952.

Mr D. R. Pigot

Mr J. M. McKenna

Mr G. Scott

Prior to leaving Horsham a few days ago to take up his position as district manager at Hastings to the South Eastern Electricity Board, **Mr G. C. B. Everard,** was presented with a standard lamp by **Mr M. Simpson,** district engineer, on behalf of colleagues with the Horsham undertaking.

Mr J. W. Cook has been appointed as representative for Ekco-Ensign Electric Ltd., covering certain South Western postal districts of London and the Greater London area in Surrey.

Mr K. M. Johnston, managing director of Babcock and Wilcox, of Africa, is to retire from that position in July next, but will continue as a director. His successor will be **Mr J. S. Woosley,** assistant managing director, who has been closely associated with the installation of boilers in Escom and municipal power stations, and with the establishment of the company's factory at Vereeniging.

Deputy station superintendent at Battersea power station, London Division, B.E.A., since 1945, **Mr G. Scott** has been appointed as superintendent at the Division's Grove Road power station. Mr Scott started his career in the industry with the Bradford Corporation Undertaking, with which he served until 1926. He then came to London, working at the Deptford East power station of the London Power Co. till 1937, when he was appointed boiler house superintendent at Battersea power station, his promotion to deputy station superintendent following in 1945.

The board of directors of B. and F. Carter and Co., Ltd., has recently been augmented by the appointment of **Mr Ben Richard Carter,** the son of the chairman and managing director of the company. Mr B. R. Carter, who is 23, is to concern himself with the sales side of the business. Educated at Giggleswick School, he served part of his engineering apprenticeship with the English Electric Co. at their Preston works. He has recently completed a term of service with the Electrical Branch of the Royal Navy.

At last week's meeting of Radio Rentals Ltd. **Mr H. F. Hunt** intimated his intention of retiring from the position of chairman of the company, which he has held for 21 years. He is to continue in the company's service as financial adviser. Mr Hunt is to be succeeded as chairman by **Mr P. Perring-Thoms,** who is now managing director. **Mr A. D. Smith,** at present deputy managing director, becomes joint managing director, and **Mr J. Leslie Wilkie,** secretary, has been appointed a director.

Mr P. J. Byrne, M.E., B.SC., A.M.I.E.E., chief engineer of the Ardnacrusha hydro-electric generating station of the Eire Electricity Supply Board, has been appointed engineer-in-charge of the Board's southern generating station, embracing within its network the new steam station at Marina Cork, the two hydro-electric stations on the Lee at Inniscarra and Carrigadrohid, and the turf-burning station near Waterville, Co. Kerry. Prior to his departure last week, he received a presentation from the staff at Ardnacrusha.

Mr F. E. London, who is now representing Venner Ltd. in the Yorkshire and North Eastern Electricity Board areas, has set up residence at 21 Penleys Grove St, York. His telephone number for the time being is York 53464.

The Minister of Fuel and Power has appointed **Mr Benjamin Pickup,** J.P., to be a part-time member of the North Western Electricity Board. Mr. Pickup is president of the Manchester Chamber of Commerce. The Minister has also appointed **Ald E. A. C. Woodcock** as a part-time member of the East Midlands Electricity Board.

Having recently resigned from the chairmanship of the Association of Manufacturers of Electric Wiring Accessories after a five-year term of office, **Mr G. T. Dickson** automatically ceases to be one of the A.M.E.W.A. representatives on the Fair Trading Council. Mr Dickson's connection with the Fair Trading Council goes back to March, 1948, when he originally represented the Accessories Section of B.E.A.M.A.

The chairman of Hoover Ltd., **Sir Charles Colston,** and his fellow directors recently gave a dinner-dance at the Dorchester Hotel to some of his supervisory factory staff and their wives. Our accompanying photograph shows Lady Colston cutting the cake which was made in the form of a Hoover cylinder cleaner.

Lady Colston cuts the Hoover cake

The Minister of Fuel and Power has appointed **Mr D. H. Kendon,** B.SC., M.I.E.E., M.I.MECH.E., as chairman of the Merseyside and North Wales Electricity Board in succession to **Mr J. Eccles,** who is now deputy chairman (operations) of the B.E.A. Since 1948, Mr Kendon has been deputy chairman of the Midlands Electricity Board. He is well acquainted with the supply needs of Wales for, prior to vesting day he was for nine years general manager of Edmundsons' largest subsidiary, the Shropshire, Worcestershire and Staffordshire Electric Power Co. An honours graduate in engineering of King's College, London, where his university studies were interrupted by service in the 1914-18 war, he began his career in the electrical industry with vacation work with Tilling Stevens Ltd. In January, 1921, he began his long association with Edmundsons Electricity Corporation Ltd. One of his early tasks was the supervision of the changeover from d.c. to a.c. in several towns in the Greater London area, and later he was responsible for the reorganisation of the supply system in the Isle of Wight. In 1934 he became deputy general manager of the Cornwall Electric Power Co. and associated companies, becoming general manager a year later, and holding that position till his promotion to the general managership of the S.W. and S. Electric Power Co. in May, 1939. As deputy chairman of the Midlands Electricity Board, Mr Kendon has applied his extensive experience in playing an important part in the development of the area. In his enthusiasm for rural development he designed, among other things, an electrical hop drier with an 11 kV heater, which was patented by the Board. He also developed an electric heat storage cooker. Mr. Kendon's new appointment took effect on Monday last.

To commemorate the completion of 25 years' service with Unity Heating Ltd., **Mr H. Pickett,** chief engineer to the firm, was recently presented with a gold watch. Our accompanying photograph taken at the function shows Mrs Pickett who received a bouquet. In the absence of Mr J. M. Young, the managing director, the presentations were made by his daughter.

Mr and Mrs Pickett receiving their gifts

Previously with the British Thomson-Houston Co., Ltd., **Mr T. F. Roger,** B.SC., is joining Stevenson and McGuffie, the consulting engineers of Glasgow, as a partner as from 1 Mar.

On retiring from the position of district commercial engineer at Grimsby, to the Yorkshire Electricity Board, **Mr B. S. Lord,** A.M.I.E.E., was recently the recipient of a presentation from Mr D. R. Williams, B.SC.(ENG.), M.I.E.E., M.I.MECH.E., F.I.F., manager of the Board's No. 7 sub-area, on behalf of his colleagues. Prior to nationalisation of the Industry, Mr Lord was borough electrical engineer and manager at Cleethorpes for 16 years, after earlier serving with the Farnsworth U.D.C.'s undertaking with which he became deputy electrical engineer.

Left: Mr D. H. Kendon, the new chairman of the Merseyside and North Wales Electricity Board

Right: Mr E. J. Larkin, of British Railways (London Midland Region)

Recently appointed deputy chairman (operations) of the B.E.A., **Mr J. Eccles,** C.B.E., M.M., B.SC., M.I.E.E., M.INST.C.E., M.I.MECH.E., has now also been nominated a member of the Scientific Advisory Council in succession to Sir John Hacking, M.I.E.E. Mr Eccles, of course, succeeded Sir John as a deputy chairman of the B.E.A. last December.

At the Birmingham College of Technology last week, an honorary associateship was conferred upon **Dr K. R. Sturley,** B.SC., PH.D., M.I.E.E., head of the B.B.C. Engineering Training Department, and an elective associateship was received by **Mr A. R. Mitchell,** late of the College's Department of Electrical Engineering.

Mr G. A. Moore, export manager to Premier Electric Heaters Ltd., was appointed vice-chairman of the West Midlands branch of the Institute of Export at a recent annual meeting. He also represents the branch on the National Council of the Institute.

Sir Edwin S. Herbert, a director of Broadcast Relay Service Ltd. has been appointed deputy chairman of the company. **Mr P. Adorian,** a director, has been appointed deputy managing director and **Mr N. J. B. Sabine** has been appointed to the Board.

Mr H. Fawcett, chief assistant, electrical and mechanical maintenance, in the Liverpool Corporation's Lighting Department, has retired after 51 years' service.

Mr E. J. Larkin, A.M.I.MECH.E., M.I.LOCO.E., has been appointed assistant mechanical and electrical engineer, Derby, to British Railways (London Midland Region). He began his railway career in 1916 as an apprentice in Derby locomotive works on the former Midland Railway and gained technical training at Derby Technical College. Later, after a spell as a draughtsman, and carrying out various tests on the footplate and inspections at locomotive contractors' works, he became superintendent of apprentices at Derby Works in 1930. There followed a period in charge of the progress office and in 1934 he was appointed second assistant to the works superintendent, subsequently introducing a production planning system which is still in use at Derby and has since been extended to other works. In 1940 he became assistant works superintendent to Derby Locomotive Works and two years later was promoted to staff assistant to the chief mechanical engineer of the former L.M.S. Railway. He has been assistant mechanical and electrical engineer (acting) of the London Midland since Dec. 1952.

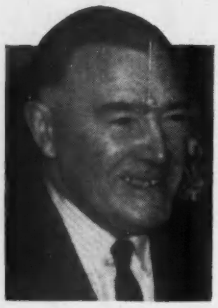
Mr M. D. Miles, an 18-year-old apprentice with South Wales Switchgear Ltd., was one of five recipients of prizes given by the Engineering and Allied Employers, South Wales Association, to the apprentices in the South Wales area considered to have made the best progress both in works experience and technical studies in the previous year.

Formerly manager of the wire and cable section of Canadian General Electric Co., Ltd., **Mr F. W. Barnhouse,** B.SC., P.ENG., has been appointed sales manager (general) to Phillips Electrical Co. (1953) Ltd., of Canada. The latter firm has also appointed **Mr E. M. Lloyd** as sales manager (specialities), and **Mr D. C. Brazier,** B.SC., P.ENG., as manager, central region.

Station superintendent at Carlisle power station, North Western Division, B.E.A. since 1920, **Mr R. Wright,** A.M.I.E.E., M.INST.F., is to retire at the end of May, we understand. Mr Wright was born in Carlisle and has spent the whole of his career there. He was with Carr and Co. as an electrical engineer before joining the Corporation Electricity Department as charge engineer in 1915.

OBITUARY

Mr J. C. Arkless, F.R.C.S., director and secretary of A. Reyrolle and Co., Ltd., died on 1 Feb, aged 63. He joined the company in February 1904, three years after its establishment at Hebburn. As the concern grew he successively became chief accountant, assistant secretary and secretary, and was appointed a director in May 1949. He was also a director of Parolle Electrical Plant Co., Ltd., the Bushing Co., Ltd., J. H. Holmes and Co., Ltd., Heaton Foundry Co., Ltd., and North East Wires Ltd. He was also a Governor of the E.I.B.A.



Right, the late Mr J. C. Arkless, of A. Reyrolle & Co., Ltd.

Left, the late Mr N. H. Miller, of British Insulated Callender's Cables Ltd.

Mr N. H. Miller, A.M.I.E.E., assistant liaison officer of British Insulated Callender's Cables Ltd., died on 29 Jan., aged 61. He started as a pupil with the Hove Electric Light Co., and then went to Siemens Brothers and was afterwards employed by the English Electric Co. at Stafford. After war service he joined British Insulated Cables Ltd. in 1920 as assistant contracts engineer of the Telephone and Power Cables Department and from 1923 onward held the successive posts of contracts manager, London district, sales engineer, London office, and manager of London sales office. He became assistant liaison officer in 1952. Mr Miller was a director of Panelec (Great Britain) Ltd., M.S.S. Recording Co., Ltd., and Industrial Reels Ltd.

Mr Albert Campbell, a member of the staff of the National Physical Laboratory for many years, died on 6 Feb., aged 91. He went to Faraday House to teach on experimental work on electrical measurements, particularly with alternating currents, in 1893, and in 1901 was chosen to be one of the group gathered round Dr R. Glazebrook to found the N.P.L., and it was there, while building up the Department of Electrical Measurements to its position of pre-eminence, that he did the bulk of the work for which he is well known.

Mr W. Young, A.M.I.E.E., who was resident engineer for Stepney Borough Council's electricity undertaking for some years, died on 7 Feb., aged 81.

Mr Robert Martin, electrical engineer and contractor, of Lanark, died on 5 Feb., aged 64.

Mr H. K. Beale, who was a director of Tarmac Ltd., and for ten years chairman of the Birmingham Corporation Electric Supply Committee, died on 4 Feb., aged 84.

Mr Christopher Wade, A.M.I.E.E., of Gabriel, Wade and English Ltd., who was well known to many in the Electrical Industry, particularly the transmission sections, died on 1 Feb. It was as a result of tests carried out in 1906 that Mr Wade first published his Tables of Wood Pole Strengths for Transmission Lines, which are still regarded as the main reference book on that subject. He read papers on the use of wood pole lines for o.h. transmission before the I.E.E. in 1907 and again in 1929. Mr Wade, who was a director of the company up to 1922, was a pioneer motorist and an early member of the Brooklands Motor Club.

BRITISH STANDARDS

Engineering drawing practice. *B.S. 308: 1953. Price 10s. 6d. net.* Any progress toward universal drawing practice is of profound importance to engineers, and hence the value of this comprehensive document is undoubtedly great. The need for such a standard has been evident for many years, but it was only until the last war, with its extensive sub-contracting of munition manufacture to works of widely varying proficiencies, that the aggravated position led to any definite step forward.

In 1944 an Inter-Service Committee was formed to consider means by which dimensions and tolerances could most accurately and clearly be incorporated in drawings, from which the manual "Dimensional Analysis of Engineering Designs" was published four years later. Fundamental principles laid down in this document have, in general, been applied in the draft of the revised standard. The following year saw the presentation to the B.S.I. of "Dimensioning and Tolerancing" by the Committee. When issued by the Institution as a draft of a second part to B.S. 308, however, this document received strong opposition, although most of its opponents recognised the basic soundness of its principles. An entirely new approach was then made in 1950, resulting in the present publication.

Of the standard's two sections, the first, under a heading of General Practice, is based on the 1943 edition. Whilst it has been amplified in some respects, it is confined to recommended principles and methods to be followed in the preparation of engineering drawings. Section Two, on the other hand, is completely new, presenting a substantial advance in drawing statement. In it a number of general principles are propounded, the more important including the requirements that the drawing should define the finished product as stipulated by the designer and that dimensions which affect the product's function should be expressed directly on the drawing. Methods of indicating dimensions, tolerances and notes are specified. and the dimensioning of common features, with a special section devoted to tapers, is also considered fully.

Much of the latter portion is concerned with the principles and methods of expression of tolerances for geometrical form (straightness, flatness, squareness, concentricity, are typical factors in such). By judicious application of these methods it becomes therefore possible to define acceptable limits of geometrical form with precision, instead of relying on individual conjecture. Concluding passages deal with dimensioning and tolerancing of profiles, and the indication of surface finish, and machining, the "tick" symbol having been adopted for the latter.

Resistance of conductive and anti-static rubber products. *B.S. 2050:1953. Price 2s. 6d. net.* Almost on the heels of B.S. 2044, comes this standard specifying resistivity limits for anti-static tyres for use on vehicles, and conductive rubber products used in hospitals. It is complementary to B.S. 2044, and gives also methods of testing such articles.

Thermosetting synthetic-resin bonded-paper insulating sheets for use at radio frequencies. *B.S. 2076:1954. Price 2s. 6d. net.* A further publication in the series on s.r.b.p. material for use as electrical installation is seen in this standard, which is concerned with sheeting between 1/64 and ¼ in. thick for use at radio frequencies up to 30 Mc/s. Electrical and physical properties of the sheet are specified, and methods of test are described at some length.

Copies of the above standards may be obtained from the British Standards Institution, Sales Branch, British Standards House, 2 Park St, W.C.1, at the prices stated.

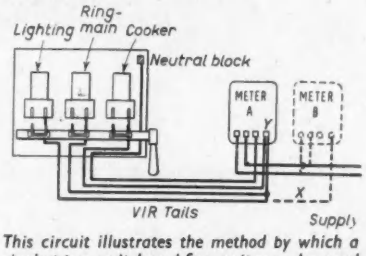
PROBLEMS AND PRACTICE

In Engineering

Installation Control

MANY meter positions, particularly the smaller ones, appear to suffer from very little forethought. One often comes across a straggling collection of switchgear which has been added to throughout the years, and usually none of the circuits marked. This almost invariably causes inconvenience to the repair electrician and is a complete mystery to the householder.

Many of these atrocities can quite easily be cleaned up and altered to conform to present day requirements. The removal of a collection of pot fuses, etc., replacing them by a neat single pole and neutral fuse-board, when installing an additional heating socket, instead of just adding yet another switch-fuse, invariably pleases a customer, who can see that his money has been well spent.



This circuit illustrates the method by which a single t.p.n. switch and fuse unit may be used with two meters for main control of a domestic installation

On new installations many improvements and economies can be incorporated at the meter position. A consumer unit is of course ideal, but unfortunately costs a few extra shillings and suffers from the drawback that only the all-in tariff can be applied. One method I have employed lately on housing estates where the installation consists of a cooker, ring-main and lighting circuit, utilises only one 30 amp triple pole and neutral switch-fuse. These can be purchased from about 30s. and form the only piece of switchgear necessary. One of the 30 amp fuseways can be used for each sub-circuit. The 30 amp fuseway for the lighting should, of course, be loaded at 5 amp and the circuit label appropriately marked. If two circuits are required for the lighting, two 15 amp fuseways can be substituted for one 30 amp fuseway providing that the fuse and switch base are separate items and not moulded together in one piece.

The main advantage, apart from the saving in cost, is that the triple pole and neutral switch-fuse can be used for either flat-rate or all-in tariff. When I first applied to the supply authority for a connection on flat-rate tariff, there was a reluctance to connect as two different tariffs were being taken through the same switch-fuse. However, as no reason why this was detrimental could be given to me, it was eventually connected, with some muttering about my being an unconventional so and so.

No further trouble on this count has been encountered and I have even obtained a connection to a 100 amp triple pole and neutral switch-fuse feeding one power circuit and two heating circuits where different tariffs were in force. The only objection raised to this was that opening the switch put all three circuits out of operation. Installing three separate 100 amp switch-fuses would have meant structural alteration to the meter room, whereas the 100 amp triple pole and neutral switch-fuse fitted in without any bother. On the very rare occasions when one circuit only was required to be isolated, the removal of the cover and withdrawal of the appropriate fuse, without opening the switch presented no difficulty to an electrician and I considered my use of the triple pole and neutral switch-fuse quite justified.—*W. Satchwill.*

Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

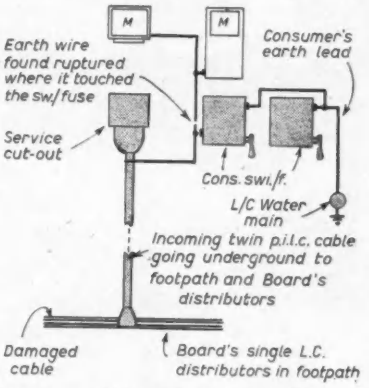
The Ruptured Earth Line

AN urgent call was received by 'phone from the caretaker of a block of public buildings. He stated that a loud explosion had been heard coming from the electrical switchboard and intake service position (230 V 2-wire d.c. supply). The caretaker also remarked that he had inspected all fuses and controls and they appeared in order. Also, that all outgoing circuits were operating satisfactorily.

I didn't disbelieve the caretaker's report, although I must admit I took it with the proverbial "pinch of salt." I operate in an area which is 40% d.c. supply and have experienced the severe arc-fault conditions which can result from the most minute faults, a situation not readily appreciated by those who are mainly familiar with a.c. supplies. Therefore, I investigated without delay. I started at the Electricity Board's service meters and consumers supply cables, checked switch contacts, fuse carriers and contacts, terminal screws if loose, and for signs of arcing anywhere.

Everything appeared quite in order, so I then quickly checked over the consumer's earthing system. It was quite intact and connected to earth via the incoming lead cold water main. I then inspected the board's earthing. This commenced with a clamp around the lead sheath of the incoming service cable, having a 7/·029 tinned copper conductor fixed to same. This conductor was connected to the board's equipment and meters. I was just about to miscry the caretaker when my hand, which was running over the Board's earth wire for continuity, came away with a broken end between one of the Board's meters and the clamp on the Board's service cable. This end was badly burned. After further inspection I then observed that, on the side of one of the consumer's switch fuse units, severe arcing had occurred and that the other end of the earth wire had become welded to it. This earth wire must have become "alive" and, as it was touching the consumer's independantly-earthed switchgear, caused an arc and hence the rupture of the earth lead.

But the query now was—how had this earth lead become "alive"? I slipped outside for a cup of coffee to inspire my feeble brain, when I espied the Gas Board's employees working with gusto in the unhappy temperature of 28°F, digging up the foot path. I casually stuck my head over the trench and observed that one of the E. Board's single p.i.l.c. distributor cables passed near to the gas


M
M
Consumer's earth lead
Earth wire found ruptured where it touched the sw/fuse
Service cut-out
Cons. sw./f.
L/C Water main
Incoming twin p.i.l.c. cable going underground to footpath and Board's distributors
Damaged cable
Board's single L.C. distributors in footpath

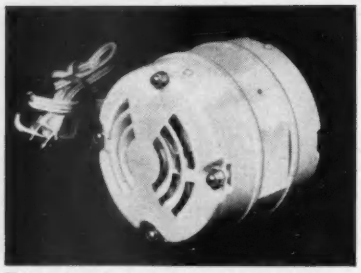
The layout of the consumer's switchgear and service termination and meters, showing the fault path to earth

service pipe. Its lead sheath appeared distorted and after a tentative enquiry I was informed that one of the workmen had inadvertently struck the cable with a fork and pierced the lead sheath and copper conductor simultaneously. The d.c. sheathing of the system (unlike most up-to-date a.c. systems) was lacking for effective continuity to earth, and the earth fault had taken a path along the lead sheath of the cable to the Board's cable lead and arced to the good earth on the consumer's switchgear.—*D. Clark.*

Equipment for Industry

Shaded Pole Motors by Hoover

FOR fan driving and similar purposes where normally the driving unit supplies a constant load, the shaded pole motor has the advantage over other types of single phase f.h.p. machines by virtue of its self-starting characteristic, thus avoiding additional starting windings, centrifugal switches and ancillary equipment. Previously, the output of such machines has been limited but various types and sizes of this motor up to 1/5 h.p. are now being produced by HOOVER (ELECTRIC MOTORS) LTD., Cambuslang, Lanarkshire, representing a considerable technical advance in shaded pole motor design. Originally produced for the 1948 Hoover washing machine, the motor was developed to meet the need for a larger output unit for this company's larger washing machine.



This unit is typical of the shaded pole motors now being produced by Hoover

Due to the inherently poor efficiencies of this type of motor—in the order of 25%—it is important to ensure that the machine is matched to the load it is to drive. This feature is critical, as overheating results from mis-matching. The company are unable to accept orders for shaded pole motors unless the purchasers are able to specify the machine's application, as motors have to be designed for each application. Only bulk orders can therefore be considered.

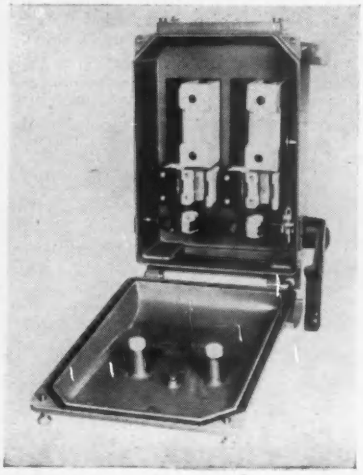
Cooling resultant from use with fan drives is one of the main reasons for this being the most suitable application. Moreover, the low efficiency means that the difference between input and output power is relatively small and hence stalling, even for considerable periods, does not result in too great a temperature rise. Of the types which have been produced, that designed for the Mk II washing machine gives a useful indication of these machines' characteristics. A four-pole machine, it has a 1/5 h.p. intermittent rating and a speed of 800 to 900 r.p.m. Cooling is provided by a spoked pulley fan. An induction squirrel cage rotor is employed, whilst copper shading rings are mounted on the poles of the stator field. A six pole, 60 c/s, 1,000 r.p.m. machine is being produced, whilst there is also a smaller version for 16 in. fans which may be either four or six pole. A reversible motor is a further manufacture, this being popular overseas for window fans. In winter it is used as an exhaust unit, in summer as an intake unit. Another unit, a six pole machine of 1/10 h.p., has a diameter of some 5½ in. and is exported in considerable quantities for use with a 20 in. fan of 2,200 cu ft/min capacity.

Weatherproof Ironclad Switchgear

NEW to the industrial market is a range of heavy-weight ("H.W.") weatherproof switchfuse units for use in installations where damp conditions predominate. Complying fully with Home Office and I.E.E. Regulations and relevant British Standards, the units are being produced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, for use at up to 500 volts, in 20, 30, 60 and 100 amp sizes. Arranged to take either rewirable or h.r.c. cartridge fuses, the carriers being interchangeable, the switchfuses are available in s.p.n., d.p., t.p. and t.p.n. types.

The weatherproof, heavy cast iron cases of the new units are undrilled, being provided with external fixing lugs and gasketed c.i. end plates. Covering slots in the top and bottom of each box, the latter can be removed and drilled for conduit entries. Wiring space provides room for all cables to enter the box at either top or bottom if required.

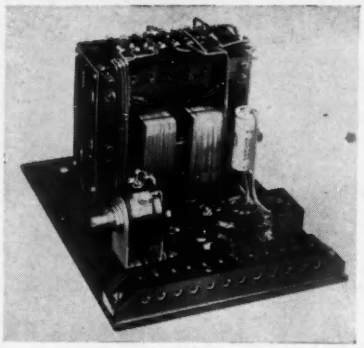
A double pole unit in the new G.E.C. "H.W." range of weatherproof ironclad switchfuses



Further room may be easily obtained by removing the spindle and switch blade assembly which is released by exerting axial pressure against a retaining spring. Connection between switch and each fuse is effected by a solid bar, which serves both as the fixed contact and as the contact for the fuse. Stated to be smooth and positive in action, switching is of the q.m.b. type, with a double break. In appearance, the unit has a flush finish, and is stove-enamelled grey.

Educational Magnetic Amplifier

WITH the increasing use of magnetic amplifiers in industry comes the need for suitable units which can be applied in colleges and other educational fields for demonstration purposes. Recognising this need, ELECTRO METHODS LTD., Caxton Way, Stevenage, Herts, have produced a unit which, supplied with full working instructions, is suitable for both educational and experimental purposes. Design is such that the amplifier's basic operating principles may be easily investigated, whilst access has been made to all important measuring points.



Neat and compact in appearance is Electro-Methods' single-stage magnetic amplifier for educational purposes

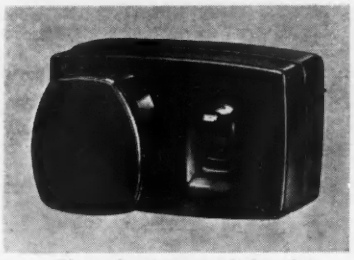
In structure somewhat transformer-like in appearance, the unit comprises two magnetic cores of high permeability nickel alloy designed to achieve close approximation to a toroid. Each core carries two a.c. windings connected in series opposition thus giving opposing flux polarities. Both cores are embraced by common d.c. windings but the mutual opposition of the a.c. fluxes in each core ensures that no e.m.f. of fundamental frequency is induced in them.

Positive feed back to ensure self-excitation is provided in the amplifier, this being arranged so that to the 100% amp-turns in the feed back circuit may be connected an additional 5%, either subtractively or additively, to give 95%, 100% or 105% f.b. Smooth control between the outer limits can be effected by shunting the 5% winding with a variable resistor. Variation of the bias is given by the provision of a bias potentiometer, the winding being supplied from a small rectifier across the supply. For use on a 20V supply at 50 c/s, the unit is stated to give a power amplification of 40,000 with 100% self-excitation, the output power being 2·7 watts in a 30 ohm load.

Temco's New a.c. Switch Socket

AFTER a long study and much research T. M. C. HARWELL (SALES) LTD., 37 Upper Berkeley St, W.1, are now introducing a range of a.c. switch sockets and plus, 3-pin shuttered to B.S.546:1950 which embody a new switch mechanism.

A brief description of this new mechanism is as follows: Switch contacts of solid



The surface pattern switch socket

silver operate through a gap of the order of ·022 in. with a snap action on both make and break no matter how slow the dolly moves. They are not held in any position that will permit continuous arcing whilst the semi-positive drive of the mechanism ensures their separation should welding occur.

Contact pressure is supplied by a coiled spring exerting force through a pivoted lever whilst the dolly is under spring control through its travel and snaps sharply into "off" and "on" positions. Its movement however can be restrained so that the switch will operate silently.

The range of plugs and switch sockets are available in 5 and 15 amp sizes in brown and cream finishes and in surface or flush patterns. The outer moulded case is a departure from the orthodox rectangular pattern in the plugs and the surface socket and the switch dolly is recessed to give extra protection to this vulnerable part.

Uses of Cellulose Acetate Film

RECENTLY received from UTILEX LTD., Kingston-on-Thames, Surrey, a booklet they have published gives information about "Utilex" cellulose acetate sheet and film. Principal properties of this material are its perfect transparency, its strength, the protection it affords agains grease, oil and water, and the fact that it is virtually non-inflammable.

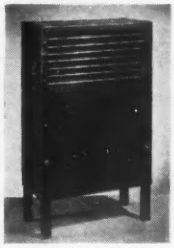
For fabrication it is quite easy to glue, weld or laminate to itself or other materials, and by the use of heat and pressure it can be formed by drawing or stamping with no loss of polish or finish. Easy to cut and sew the material will take printing, silk screening, spraying and labelling.

In view of its other properties of light fastness, lightness in weight and washability, "Utilex" cellulose acetate as a colour translucent film is ideal for lamp shade material. In the form of films and tapes the material has good electrical insulation properties. Its use is suggested as electrical tapes, interleaving sheets, slot liners, and in many cases it can be used as a replacement for mica and mica tapes. Thicker sheeting can be used as a dielectric in condensers and for insulation between layers of multiple wound coils.

Creasey Space Heaters

DESIGNED either for wall mounting with brackets or fitted with legs the new convector space heaters marketed by CREASEY & CO., 1 and 2 Regent Sq., London, W.C.1., are available as ½, 1 and 2 kW models.

The 500 W model measures 19½ in. by 11½ in. by 6 in. and costs £3 plus £1. 2s. 6d. purchase tax. The 1 kW model measures 19½ in. by 17½ in. by 6 in. and is switched to enable loading to be halved. Price is £4. 10s. plus £1. 13s. 9d. purchase tax, whilst the largest model has a loading of 2 kW and has two switches enabling loading to be reduced to 1½, 1 or ½ kW. All models are finished in bronze and fitted with 6 ft of cable.



The ½ kW Creasey floor standing model

For the Electrical Trade

New Speedfix Tape

NEW Speedfix self-adhesive vinyl tape just released by INDUSTRIAL TAPES LTD., Speedfix House, Duke's Road, W.C.1, is made on a transparent Polyvinyl Chloride basis. It has great tensile strength and is practically impervious to moisture. On test the product has withstood complete immersion in water without effect. C.C.I. and A.I.D. approved, Speedfix vinyl tape has the following properties:—

Tensile strength—22 lb.
%elongation—30/40%.
Total thickness—2·8 thou.
Moisture vapour permeability at 40°C 27 g.s.m. per day.
Water absorption—negligible.
Chlorides—below ·05%.
Sulphates—below ·025%.
Dielectric strength—2,000 V.
Insulation resistance—
Minimum 20,000 megohm.

Gad-About Now in a Case

AN attractive red case is now supplied with the "Gad-About" travel iron by ELGA PRODUCTS LTD., Elga Works, Railway Place, Wimbledon, S.W.19.

This not only serves as a pack for travelling but is in itself an excellent sales aid. It shows at a glance the outstanding features of this 1½ lb universal voltage travel iron, which has a sole plate same size as a normal household electric iron.

Nowadays travel irons are no longer a seasonal sale but find a good sales right round the year. Price of the "Gad-About" is 38s. 3d. complete in fitted case.

The Gad-About in its new case

TRADE PUBLICATIONS

RADIO-TELEPHONY.—A brochure recommending the use of radio telephone equipment in industry has been published by the Radio Communication and Electric Engineering Association, 11 Green St., Mayfair, W.1.

SILICONE RUBBER.—Midland Silicone Ltd., 19 Upper Brook St, London, W.1, have now issued an illustrated booklet about Silastomer Silicone rubber.

CLOCK SYSTEMS.—Controlled electric clock systems by Gent & Co., Ltd., Faraday Works, Leicester, are featured in a new catalogue issued by the company.

RADIO EQUIPMENT.—"The Independent sideband receiver type GFR 552" is a new 20 page publication recently made available by the Equipment Division of Mullard Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

COMPONENTS.—The Plessey Co., Ltd.'s latest catalogue No. 654 contains data on the range of drives and couplings made by them and is of interest to the radio manufacturer.

ALUMINIUM ALLOYS.—An addendum to Applications Brochure No. 6 "Bulbed and lipped structural aluminium alloy sections (angles and channels)" has been published by the Aluminium Development Association, 33 Grosvenor St, W.1.

NICKEL ALLOYS. No. 24 issue of the periodical issued by Henry Wiggin and Co., Ltd., Wiggin St, Birmingham 16 contains features about the use of Ferry alloy in electrical instruments, the use of Nimonic 80a in gas turbines and Brightray and Ferry in resistances.

NEWS OF THE WEEK

NATIONAL WAGE NEGOTIATIONS WANTED

Protest to Minister on Scottish Electricity Bill

OMISSION of the principle of U.K. negotiations for wages, salaries and conditions from the Scottish Electricity Reorganisation Bill is the subject of a strong protest forwarded to the Secretary of State for Scotland, Mr J. Stuart, by the Employees' National Committee for the electricity supply industry. The Committee unanimously decided at a meeting last week to "express the extreme concern" felt by the trade unions. A statement issued at the time said that the Committee decided it should be made clear to the Minister that the principle of national negotiations was a matter of vital importance to the trade union movement in Scotland, as it was also in the rest of the U.K., and one that could not be surrendered lightly.

The Committee are to inform both the T.U.C. and the Scottish T.U.C. of the position, pointing out that the Government's action may establish a dangerous precedent for other nationalised industries. It is emphasised that the Employees' National Committee will take every constitutional course open to them to bring about a more satisfactory labour relations clause before the Bill completes its course in the House of Commons.

This Committee is made up of all trade unions and staff associations having negotiating agreements with the B.E.A.

A report of the debate on the Electrical Reorganisation (Scotland) Bill is on page 206.

E.P.E.A. WANT MEETING WITH B.E.A., OR ELSE...

TODAY, 11 Feb., the B.E.A. is to consider the request of the Electrical Power Engineers' Association that there should be a direct meeting with the Authority to discuss the Association's claim for a "substantial improvement in the status and salaries of engineers and technologists in the Electricity Supply Industry."

The E.P.E.A. has stated that should the request for the interview not be granted, then the Association has decided reluctantly to serve notice under clause 47 to terminate the National Joint Board Agreement. Under this clause six months' notice of termination of the Agreement is required by either side.

It will be recalled that last December the National Executive Council of the E.P.E.A. decided that "immediate and drastic steps be taken to improve the status and salaries of the technical staff in the Electricity Supply Industry."

Three Electrical Firms share Dollar Order

THREE British electrical companies share an initial order placed by Hazeltine Electronics Corpn. of New York, under its offshore procurement prime contract with the U.S. Navy Department. They will supply electronic equipment and associated test gear which will be installed in ships and ground stations as part of the N.A.T.O. defence system. The order is said to be worth $6\frac{1}{2}$ million. The three companies are the British Thomson-Houston Co., Ltd., Ferranti Ltd., and the General Electric Co. Further large and valuable orders are expected to be placed shortly. The orders will be completed in about $2\frac{1}{2}$ years.

Attempt to Bring Out Non-Unionists On Strike

THE Manchester area is the scene for this week's strike of electricians in the contracting industry by the E.T.U., which began on Monday. Nearly 1,000 men are involved. The Union has also attempted to bring out non-union men by offering them strike pay on the understanding that they will afterwards join the E.T.U. According to the Union, the Manchester strikers are in addition to the 1,800 other workers who have been involved in indefinite strike action for the past three or four weeks.

On last week's strike of electricians in the Merseyside area, Mr L. C. Penwill, director and secretary of the National Federated Electrical Association has said that records from members of the Association showed that not more than 60% of their workers responded to the strike call.

U.K. FIRM FORMS NEW COMPANY IN CANADA

ANOTHER English bridgehead has been established in the Canadian market. A. H. Hunt (Capacitors) Ltd. announced last week the formation of Hunt Capacitors (Canada) Ltd., which will manufacture capacitors previously imported from this country at their new premises at Ajax, Ontario. Actual production is expected to begin before the end of next month. Thus the Canadian market will be provided with an immediate service of capacitor requirements. Products of this new Canadian company will be marketed by the electronic tube and components division of the Canadian Marconi Co., Toronto. Mr K. A. Jackson, formerly with the Canadian Marconi Co., has been appointed general manager of Hunt Capacitors (Canada) Ltd., and Mr R. A. Grouse of the British parent company has been appointed technical director.

First of seven double bogie, six axle electric locomotives of the Co-Co type, intended for the Manchester-Sheffield electrification scheme is now undergoing trials. Electrical equipment was supplied by the Metropolitan-Vickers Co., Ltd., and mechanical parts were built at Gorton works. The locomotives are of the mixed traffic type but primarily intended for passenger service.

Distinguished visitor to the Historic Collection at the Chelmsford works of Crompton Parkinson Ltd. recently, was Miss Hazel Crompton, 72-years-old youngest daughter of Col. R. E. Crompton. The collection forms a record of her father's early work from 1878 to about 1904. She is seen inspecting a 15 h.p. d.c. crane motor (it was still running in 1946) installed when the new works opened in 1896

Consumers' Council delays Industrial Tariff

PROPOSALS by the S.E. Scotland Electricity Board to introduce a new industrial tariff on 1 Apr. have been rejected by the Consultative Council. The proposals are to be submitted for further consideration to the Council's district committees and consequently the introduction of new charges will probably be delayed.

The Board has decided to introduce a standard form of industrial tariff under which consumers would have the choice of three different tariffs. These comprise a block tariff similar to that in force for commercial consumers; a maximum demand and unit tariff, to be ascertained monthly, and a maximum demand tariff chargeable annually. It is pointed out that no increased revenue would result from the revisions, but it would bring about uniformity throughout the Area. Edinburgh consumers would have to pay more, industrialists in Fife would pay about the same, and consumers in the Lothians would be paying less.

The Council objected to the fact that they had been asked to consider and decide on the new tariff structure at a single meeting, and were also concerned about 80 industrialists in Edinburgh who would have to pay an average increase of £215 each. The matter will be reconsidered at the Council's next meeting.

Electrical Exhibition will be Twice Size of 1953 Show

LITTLE over a month remains now before the opening of the 1954 Electrical Engineers Exhibition at Earls Court. We are able to report that there are now over 180 exhibitors which is over 70 more than last year, making this year's display twice the size of that in 1953. Opening ceremony will be performed by Sir Henry Self, dep. chairman of B.E.A.

Approval has been given to a huge scenic painting which is to be erected across the wall of the Grand Hall. It depicts one of Britain's latest power stations. Alongside the platform will be a 25 ft B.T.H. circuit-breaker, part of the Heavy Switchgear Avenue. This equipment will be flood lit both inside and out. There are numerous entries of heavy and light switchgear, and also for the 1954 awards to be judged again by the A.S.E.E. technical and E.A.W. committees. For the first time, the Department of Atomic Energy has a stand, on which will be displayed models, photographs and drawings of the layout of the new generation equipment. The Exhibition will be held from 16-20 Mar.

Edmundsons Reunion

AT last year's dinner of the ex-Edmundsons staff it was agreed that the reunion should be an annual event, and accordingly the committee has made arrangements for a 1954 gathering. This will take place at the Holborn Restaurant on 30 Apr. Reception will be at 6.30 p.m., tickets will be 16s. 6d. each, and early notification of intention to be present will be helpful.

Shipping Line Responsible for Damaged Cable

A SUCCESSFUL action was brought by the N. of Scotland Hydro-Electric Board in the Court of Session, for damages alleged to have been caused to the submarine cable between Kyle of Lochalsh and Skye. The Board sued David MacBrayne Ltd., whose ship, the *Lochmor*, was said to have dragged her anchor and fouled the cable. This the pursuers maintained was the result of negligent navigation. The accident occurred while the ship's crew were trying to avoid damage to the ship and pier, where she was berthed, in the face of a hurricane on Sunday, 30 Dec.

Lord Hill Watson said there was no doubt the electricity supply to Skye was interrupted soon after the *Lochmor's* anchor fouled the cable. When the cable was examined it was found to have sustained extensive damage, and he had no hesitation in deciding the damage was caused by the anchor. Lord Hill Watson said the master of the ship was guilty of negligence for while it might be good seamanship to allow an anchor to drag sometimes, it was bad seamanship to allow it when close to an electric cable.

The First Half-Century

The question of nuisance is becoming a serious one for electric lighting stations in England, and especially in London. Only the other dav a school obtained an injunction against a station in the Isle of Wight ordering it to abate the vibration and noise due to some gas engines; and now St. Pancras Borough Council is ordered not to carry on its Camden Town destructor works and generating station so as to annoy its neighbours by noise, vibration and smell. Thus the Council is between the devil and the deep sea. It is under statutory obligation to continue the supply; it can hardly close its dust destructor, apart from its dependence on the heat thereof for the electricty works, and yet it must not disregard Mr Justice Joyce's injunction. That it has to pay costs of the action is a matter of course, but a small thing.—*From our issue of 11 Feb., 1904.*

Interior of the new service centre opened on the Inch housing estate, Edinburgh, by the S.E. Scotland Electricity Board, as noted last week. The showroom is in the planned shopping area. At present there are about 2,000 houses of the ultimate 4,000 built

Exterior view of the N. Western Board's new mobile service centre which is operating now on the new Wythenshawe estate and at Denton and Droylesden

Modern Mobile Showroom to serve 20,000 Houses

RAPID housing development in the Manchester area has left some 20,000 new householders on the new Wythenshawe estate without a convenient electricity service centre. The estate is some 10 miles from the city centre and although space has been reserved in the proposed civic centre, it will be some time before this building is completed and even then it will not be readily accessible to all inhabitants. The situation demanded a mobile showroom, and one of the most up-to-date in the country has now been put into service by the N. Western Electricity Board. The showroom covers Denton and Droylesden in its rounds besides the large Wythenshawe estate.

The centre moves to a fixed position in a different part of these districts each morning and afternoon. An interesting feature is that the Board has erected special pillars so that the vehicle can be supplied with electricity from the mains and connected with the Board's telephone system. All the services of a normal Electricity Showroom are available. Consumers can pay their accounts, buy easy payment stamps, see displays of various appliances, and attend demonstrations. A feature of the showroom is the large window area allowing fullest display facilities, and the "coach" can be entered from the rear or from either side. This mobile service centre is lit by four 4 ft fluorescent lamps and heated by convectors.

OFFICIAL PUBLICATIONS

BRITISH INDUSTRIES FAIR (Guarantees and Grants) BILL. Commons Bill 61. H.M.S.O. 3d.

BRITISH STANDARDS B.S. 91: Electrical Cable Soldering Sockets; B.S. 2084: Cotton-covered round copper wires (metric units); B.S. G.145: Extra-low voltage and low voltage spring return non-latch switches for aircraft.

MINES. Report of H.M. Inspectors of Mines for 1952; W. Midland and Southern Divs. H.M.S.O., 1s.

SAFETY IN EMPLOYMENT (Inspection and Safety Organisation) BILL. House of Commons Bill 18. H.M.S.O., 6d.

TELEVISION INTERFERENCE ON ELECTRIC RAILWAY

IT may be recalled that early in December a question was asked in the House of Commons concerning television interference from the Lancaster-Morecambe-Heysham electric railway. Mr D. Gammans said at the time that tests were being carried out to ascertain the cause. An official statement has been issued now by the London Midland Region to correct any erroneous impressions which may have been formed that the trouble can be attributed to this particular system of electrification.

Tests have revealed that the interference is due to discharge across small voids between conductor and insulator surfaces on the catenery supporting insulators. This could also occur with any e.h.t. transmission line using pin type insulators, it is stated. Insulators have now been treated with conducting grease and consideration is being given to the use of a special type of insulator as a more permanent cure, we understand.

E. T. INDEX

THE index to Volume 124 of the ELECTRICAL TIMES, covering the period July to Dec. 1953, has been published and is available on application from these offices: Sardinia Hse., Sardinia St, W.C.2.

PROSPECT OF LARGE ORDERS FROM MOSCOW

BUSINESS worth about £400 million is available to the party of 30 or more British executives now on a trade visit to Moscow. Not all of this concerns electrical commodities but the proportion is large and should provide representatives of the industry with an admirable basis for their negotiations. A long list of items which the Russians need was given to the U.K. delegation soon after its arrival, but many are understood to be strategic exports. Electrical equipment in the Soviet Foreign Trade Minister's list included 110 power station generator sets of 500 kW, 1,000 kW and 1,500 kW; 150 steam boilers of 20 to 30 tons; 20 5,000 kW power trains; 150 diesel electric station sets of 310 kW to 865 kW; 50 air circuit-breakers; £6·36m worth of miscellaneous electrical equipment; and various types of transformers. The Minister said Russia was prepared to place orders for equipment on the list during the next three years.

At the time of going to press there was no news of any contracts being signed by electrical representatives. Last known whereabouts of Mr J. B. Scott, of Crompton Parkinson Ltd., and leader of the delegation, was Stalingrad.

Electrical Wholesale Trade

SOME preliminary figures have just been published derived from returns made by wholesalers in the Census of Distribution and other Services for 1950. The information given by wholesalers will be analysed in the census report to show the part played in distribution by firms operating in a variety of ways. The two preliminary tables published give a breakdown of methods of trading and also kinds of business. In the latter we note that 1,282 were concerned with electrical commodities. Sales amounted to £132,696,000. Persons engaged in this field numbered 23,652 and £8,827,000 was paid out in wages and salaries.

There was a total of 773,000 persons engaged in wholesaling, including working proprietors, and the total number of establishments included in the census was 55,472.

Mr W. H. McFadzean (right) deputy chairman and chief executive, and Mr D. T. Hollingsworth (left), chief engineer, of British Insulated Callender's Cables, Ltd., discussing with B.B.C. reporter Douglas Willis, the $3 million contract for submarine cable for the British Columbia Electric Co., to which we refer on page 210

Hull and Holmfirth have Best Displays in YEB

THE annual Christmas window display competition among service centres of the Yorkshire Electricity Board took place last December and we have just received the results. In common with most other similar competitions, Yorkshire have found it advisable to divide the contest into two classes to cater separately for showrooms with a large amount of window space, and those with only a small area. Christmas, 1952, showed that small windows tended to be overshadowed by the impressiveness of larger displays, and also that centres with more than one window concentrated on one whilst neglecting the others. Consideration was thus given to the overall display in 1953.

Eventual winners in class A was the service centre at Ferensway, Hull. The Sunbridge Rd, Bradford, showrooms were second, and last year's winners at Huddersfield were specially commended. In class B, first prize went to the Holmfirth service centre, second to Otley, and a special commendation to Pontefract. Prizes in each case were silver cups and certificates of merit which were presented by the Board's chairman, Mr D. Bellamy, at luncheons arranged in honour of the winners. Mr Bellamy stressed that the purpose of the competitions was to encourage staffs in their efforts so that displays in the Area reached and maintained a high standard. The standard of display was higher than in 1952.

Mr D. Bellamy, YEB Chairman, presenting trophies to the winners of the Board's Display Competition. Recipients are (below) Miss E. Wilson at Hull, and (right) Mr W. Pollitt at Holmfirth

[Safety Delegates for Firms to be Compulsory?

ACCIDENT machinery based upon co-operation between employers, employees and official inspectors is proposed in the Safety in Employment (Inspection and Safety Organisation) Bill, which is due to be debated in the House of Commons on Friday, 26 Feb. This private member's Bill provides for the election of "safety delegates" wherever there are five or more employees, the scale to be one delegate for the first 50 employees and one for each subsequent hundred. Safety delegates would have to make a systematic inspection of their workplace at least once monthly, and report. Co-operation between delegates and official inspectors is provided for, and central and departmental safety committees are required to be set up. Activities under the Bill would be co-ordinated by a National Occupational Safety and Health Committee.

B.E.A.'s Peak Load

PEAK load of 15,700,000 kW carried by the B.E.A. on 25 Jan. was exceeded on 1 Feb. by a load of 16,300,000 kW. In our story on the B.E.A.'s success in carrying the load the figure of 15,700,000 kW was given correctly in the heading. Figures in the text should, of course, have read 15,700 MW and 14,000 MW, and not 15·7 MW and 14 MW.

NEWS IN BRIEF

Principal guest at next week's annual luncheon of the Electrical Trades' Commercial Travellers' Association, will be the recently appointed deputy chairman (operations), B.E.A., Mr J. Eccles.

Only gas cookers are being installed by Desborough (Northants) U.D.C. on the Peaslands estate, and tenants will not have any choice.

Up-to-date details of the company's apprenticeship schemes is contained in a new booklet published by Brush Electrical Engineering Co., Ltd.

A new and revised edition of their cookery book has just been published by Jackson Electric Stove Co., Ltd. It has been compiled by Esther Purvis, contains some 700 recipes and many other electrical hints, including meter reading.

National Institute of Agricultural Engineering, Wrest Park, Silsoe, Beds, will be open for inspection on 26 and 27 May.

Annual dinner and dance of Belfast Association of Engineers will take place at the Grand Central Hotel on 5 Mar.

Tickets at £1. 1s. each are available from the hon. secretary, Mr C. T. Whittaker, c/o M.E.B., 31 Kingsway, Stoke, for the buffet dance of the E.I.B.A.'s N. Staffordshire branch on 12 Mar.

The Rt. Hon. Geoffrey Lloyd, Minister of Fuel and Power, will be principal guest at E.D.A.'s annual luncheon on 14 Apr.

Inaugural meeting of the West Bromwich branch of E.A.W. took place at the end of Jan.

The Hants and Dorset branch of E.I.B.A. have postponed their Annual Ball until 4 Mar.

Exporters advised to visit Middle East

MEMBERS of the Trade Mission which recently returned from the Middle East gave their impressions of conditions and prospects at a meeting of the London General Export Merchants' Group. Sir Edward Benthall, who led the party, said he was confident that there were excellent opportunities for this country in the areas visited provided prices were competitive. He strongly recommended British exporters to visit the Middle East and study the markets, and in particular to support the Baghdad Trade Fair next October. Some details of this Fair were given by Sir Norman Kipping in Nottingham last October (see our 22 Oct. issue). It was emphasised by Sir Edward, that Trade Missions were of little use unless they were quickly and energetically followed up by individual businessmen themselves.

Financial Help for Industry in N. Ireland

A BILL is to be introduced by the N. Ireland Government to enable the Ministry of Commerce to make grants towards capital expenditure by industry in the six counties on the purchase of plant and machinery and on the construction of new buildings. Announcing this last week the Minister said it was recognised that financial help was necessary to encourage industry to invest in new plant and buildings up to the level required to increase productivity or to expand production and give increased employment. It was intended to make annual grants covering a period of three years, and in each case these grants would be related to expenditure in the firm's accounting year. A small Committee of Accountants is to advise the Minister on accounting practice so that the proposals could be co-ordinated with existing practice.

101 CANDIDATES PASS HOUSECRAFT EXAMS.

DETAILED results of Electrical Housecraft Examinations, run twice annually by the E.A.W., were given last week. Both examinations took place at various centres throughout England and Scotland last December. In the test organised for demonstrators and saleswomen, 68 candidates qualified for the certificate and four of these gained distinction. The total number of certificate holders thus rises to 2,074. In the equivalent examination for teachers, 33 candidates passed, one with distinction, and the total number of certificate holders is now 1,850.

The Association's diploma awarded to certificate holders of experience who pass a practical test has recently been gained by Miss M. H. Jones of Macclesfield and Miss J. F. Ollis of Welwyn Garden City. To date, 462 demonstrators and 91 teachers have qualified for this award.

QUESTIONS IN PARLIAMENT

Power Exchange

THERE has been a deal of talk in recent months about the "export" of electricity from Scotland to England, and the matter was raised in the House by Mr G. Nabarro. He wanted to know the amount transmitted to and from England during 1953. Mr J. Stuart reminded him that there was usually a simultaneous exchange and to that extent gross figures might be misleading. He had been informed however that on the main transmission lines 211,034,000 units were sent from Scotland to England and 236,975,000 units from England to Scotland. In answer to a further question, Mr Stuart said he could not usefully forecast future maximum demand or the extent to which it will be met by Scottish supplies. The balance between supply and demand varied from day to day: on 25 Jan. there was a deficiency of 3·5 MW. The Hydro-Electric Board had guaranteed 185 MW for this winter and next.

Moriston Project

ESTIMATED cost of implementing the revised Moriston project of the N. of Scotland Board, and comparisons with the original scheme was sought by Major W. J. Anstruther-Gray last week. Mr J. Stuart replied that the revised project involving a road diversion would cost about £180,000. It was intended to replace the original proposal for a viaduct across Loch Loyne, which was expected to cost £275,000.

TV in Plymouth

ESTIMATED cost of the television station at North Hessary Tor was between £200,000 and £250,000, Mr D. Gammans stated in a written answer. Only a small part of this would be used in making temporary arrangements. As regards completion dates, he said it would be easier to estimate when it was known that construction could begin. It was hoped, however, to have the temporary station in operation within a year and the permanent station by the end of 1955.

Technical Education

Mr W. R. WILLIAMS has given notice that he will call attention to the need of maintaining and expanding the technical education service and move a resolution tomorrow (Friday).

Pooling of Research

AVAILABILITY of the results of research work carried out by the Government, industrial and university laboratories, to small firms who could not maintain their own research departments, worried Mr W. Hannan last week. He asked the Secretary of State for Scotland if any co-ordinating body existed and whether he could consult those concerned to find a means of conveying such scientific and technological information to them. Mr J. Stuart said there was a free exchange of information, and D.S.I.R. operated a technical information service available to large and small concerns alike. He added that the Department was about to make arrangements with the Scottish Council for a study of the special needs of small firms in Scotland for research and technical information.

B.I.F. Bill

THE British Industries Fair (Guarantees and Grants) Bill was read for the first and second time and was printed during the past week. It seeks to empower the Treasury to guarantee loans and the Board of Trade to make grants to British Industries Fair Ltd.

Loss of P.T. Revenue

REPLYING to Mr D. Jay on the revenue gained or lost by changes in purchase tax last month, Mr R. A. Butler said he estimated that in a full year the increase in tax would yield about £1 million. At the same time the reductions would cost about £3 million.

Technical Libraries

THE Board of Trade was urged by Mr A. Pearson last week to seek means of extending the facilities provided by the setting up of more technical libraries. Mr P. Thorneycroft said he was well aware of the importance of these libraries and would consider the suggestion that further publicity be given to them in *Target*. Meanwhile, the British Productivity Council were doing what they could to encourage technical reading both centrally and through local productivity committees.

Electricity in Wales

IT MAY have been the close proximity of the debate on the Electricity Reorganisation in Scotland Bill, or a general feeling of satisfaction about electricity supplies in Wales, but whatever the cause, there were few references to the electricity supply industry in last week's debate on Welsh Affairs. There was genuine satisfaction at the S. Wales Board's proposals for further rural electrification. Mentioning this matter, Mr R. Gower called attention to the allegation that farmers were not always responding to the new service. He expressed the hope that the rural community would realise the expense involved in taking electricity to them and co-operate by using it reasonably and widely, and not merely for lighting. Mr T. Watkins echoed this view but offered the suggestion that the Board publicise the extension of supplies much more. If a private undertaking laid on a supply to a village for the first time, there would be a terrific "to-do," he said.

The debate would not have been complete without a request for a separate Welsh unit as regards nationalised industries. The matter was raised initially by Mr Gower, and Sir David Maxwell-Fyfe dealt with the matter in his reply to the debate. He said the topography, with mountains in the centre, raised a great argument against one Electricity Board for Wales. Sir David added, however, that he would be glad to hear the matter debated at greater length some time.

Some concern was expressed by Mr A. Pearson about the proposed new power station at The Leys, not only about the siting but also the process in deciding the site. He asked why planning authorities were not consulted first, before tests for foundations and other enquiries were carried out. Sir David said no proposal had yet been submitted to the Fuel Minister for this power station. He went on to explain the procedure in these cases, pointing out that there was ample opportunity provided for all interests to state their objections. There were many difficulties involved in selecting a site and it had first to be decided whether it was a practical proposition to build a power station before submitting the problem to the Minister.

Tax on Washing Machines

WHY, when the recent reductions in purchase tax were announced, were electric washing machines excluded, asked Mr R. F. Crouch. The Chancellor said that this action would involve singling out electrically operated washing machines from the wide range of electrical domestic appliances taxed at the same rate. He said he was aware of no sufficient reason for doing that.

Hire Purchase on Washing Machines

A NUMBER of representations on the effect of the Hire Purchase and Credit Sale Agreements (Control) Order on sales of hand-operated wringing and washing machines were being considered carefully, but no statement could be made at present, Mr P. Thorneycroft stated in the House. Most recent representations had come from the Washing Machine Makers Association on 28 Jan. He was replying to Mr H. Hynd who had asked whether reports had been received on the effect of the order and whether the abolition or at least a reduction of the required deposit of 33⅓% could be announced.

One Board for Wales

ON Monday Mr R. Gower asked at Question Time about the possibility of setting up a Welsh Electricity Authority and a Wales Electricity Board. He particularly sought the formation of a committee to investigate the suggestion. Mr G. Lloyd repeated the main argument of geography against the proposal and said circumstances were quite different from those in Scotland.

ELECTRIC SUPPLY NEWS

Belfast

THERE was further discussion on the question of tenders for plant for the new West power station at last week's meeting of the City Council. The matter was raised by Alderman M'Kee who intimated that he was concerned in case the Corporation did not deal promptly with the tenders which were being lodged with the town clerk early in March. He said that the specification for the boiler plant provided for stokers to be of Babcock and Wilcox or other approved manufacture. It was already known that that firm had refused to supply two other concerns who had since written to the consultants asking for approval of the type they proposed to submit. Alderman M'Kee proposed that indication should be given as soon as possible whether the alternative stokers mentioned would be acceptable. His suggestion was rejected, however, after members were told that a minute from a meeting of the Electricity Committee on 18 Jan. stated that they were not prepared to state before the tenders were received whether the alternative stokers would be acceptable.

At last Friday's meeting of the Corporation Electricity Committee it was decided to recommend the Council to invite the Minister of Commerce to introduce legislation enabling him, on behalf of the Corporation, to place the contracts for plant and equipment for the new West power station, should such a course be deemed necessary after 1 May. It seems likely such legislation may be promoted if the Corporation has not placed the orders by 1 May.

Dartford

MORE usually concerned with getting assistance from local authorities in connection with the disposal of its own ash and other refuse, the B.E.A. is now providing similar help in reverse to the Dartford Rural Council, Kent. Consultations recently took place between the B.E.A. and the Rural Council with a view to the latter depositing house refuse in a disused pit at Littlebrook power station. The B.E.A. were prepared to enter into an agreement with the Council on the basis of the latter tipping a maximum of 750 cubic yards of house refuse a week and paying the Authority a fixed periodical payment of £21 17s. 6d. The B.E.A. would provide sufficient ash to cover the refuse and meet all outgoings in respect of the pit and its working. It was anticipated that not more than 420 cubic yards of house refuse would be tipped by the Council each week and the standing charge would be reduced accordingly. The Council's Clerk has been authorised to enter into the necessary agreement.

Durham

THE Council of Durham Area of the National Union of Mineworkers is asking for the installation of an alternative means of power at collieries where electricity has replaced steam for hauling the cage, operating the ventilation system and other purposes. The Council believes that if there was an electric power breakdown, and the cages and ventilation system were interfered with, miners underground at the time may be endangered.

Eastern

TO provide for more efficient utilisation of men and materials in the expanded rural electrification programme of the Eastern Electricity Board in the Fens sub-area, plans for a reorganisation have been announced by Col A. E. Knights, the sub-area manager. Instead of, as in the past, the teams working under instruction in the various districts dealing rather in piece-meal style with small electrification schemes, all such operations are now controlled from a sub-area construction office at St. Neots, which will handle all proposals for the erection of lines and construction of sub-stations, etc. This enables a greater concentration of construction gangs in any part of the sub-area, to provide quicker completion of the larger schemes now permitted.

Eire

THE existing domestic two-part tariffs are to be replaced by new tariffs, except for consumers on the rural network. Under the new tariffs, to operate from 28 Feb., the price of the first 360 units used bi-monthly is 1·4d. p.u. with all over at 1d. p.u. In addition there is a bi-monthly fixed charge based on the number of rooms. For the Dublin area, this is 8s. for five rooms or less plus 3s. for each additional room up to ten. In the Greater Dublin area, Cork, Limerick and Waterford the fixed charge is 8s. for 4 rooms and 3s. per room over, while in other areas of supply the unit rate is 1¼d. for the first 360 units, and the room charge is 9s. for 4 rooms plus 3s. over. In the current limiter scheme the new weekly rates, operating from 5 Apr. are: 60 W 1s., 100 W 1s. 6d., and 150 W 1s. 9d.

Sayings OF THE WEEK

"The export of atomic power stations to other countries may become of overriding economic importance to Britain." —Prof. F. E. Simon, in a lecture at London University.

"It is ironical that at a time when engineers and technologists are drawing closer together the electrical links in the south between England and France, Her Majesty's advisers should be severing the electrical links between England and Scotland."—Mr A. M. F. Palmer, in the debate on the Electricity (Scotland) Bill last week.

"Peace in any industry is something which cannot be expected, and if such a state of affairs did prevail it would cause apathy amongst our members, resulting in a marked effect on trade union activities."—L. Price, area official, writing in the journal of the Electrical Trades Union.

Frazerburgh

THE erection of the 132 kV transmission line from Rothienorman to Strichen for the North of Scotland Hydro-Electric Board, has begun. The line is expected to be in operation by the autumn, and a new substation at Strichen should be completed by Easter.

Haltwhistle (Northumberland)

THE Rural Council has approved plans by the North-Eastern Electricity Board for the construction of power lines to Tows Bank, Coanwood, Eals Village and Lanehead Coanwood.

Lanchester (Co. Durham)

THE electricity supply network maintained by the National Coal Board in the villages of Langley Park, Holmside, Peartree, Quebec and Hamsteels, was criticised at a recent meeting of the Rural Council. The chairman, Councillor Hoult, said that at night when the demand at the local collieries was at its height, household supplies were cut. The power was so poor that people with electrical appliances could not use them. It was reported that the North-Eastern Electricity Board were to take over the network at Quebec and Hamsteels while at Holmside and Peartree efforts were to be made to improve the supply by using another power line. The Coal Board stated that the best way to improve the supply at Langley Park would be for the Electricity Board to take over the network.

Nottinghamshire

OFFICIALS of the B.E.A. are at present carrying out investigations on the banks of the River Trent around High Marnham, near Retford, with a view to the establishment of another generating station in that area.

South Eastern

FROM this month, the South Eastern Electricity Board have again segregated Guildford and Woking into two separate districts, with Mr W. E. Affleck continuing as district manager at Guildford, and Mr J. C. Poole, as district manager at Woking, as we have already noted. This change follows the recommendations of Mr Affleck on his experience during the past year as manager for the combined Guildford and Woking district.

Stoke Newington

THE borough council is to ask the London Electricity Board to introduce as soon as possible an assisted wiring scheme, similar to that formerly operated by the Metropolitan borough councils who owned electricity undertakings. The first aim of this new scheme would be to aid cases of hardship in which a tenant whose landlord has refused to pay for renewal of faulty electric wiring is faced with either a bill for repairs or disconnection of the electricity supply.

Windsor

THE Southern Electricity Board's practice of requiring guaranteed revenue payments in respect of power supplies to housing estates was described as "distasteful" at a recent meeting of Windsor R.D.C. The council is objecting to the Board's request for a revenue payment of £780 p.a. for five years for laying mains to Newton Court site, Old Windsor, where the council propose ultimately to erect 112 dwellings. Following earlier discussions the Board had written to the council pointing out that the revenue figure quoted had been based on the assumption that the estate would be developed fairly rapidly and as one unit, any deviation from that might well alter the terms quoted. The council agreed to tell the Board the programming of the rate of development of the Newton Court scheme was entirely outside the council's control and it was impossible, therefore, to give any accurate forecast on the subject. At the same time, the council were unwilling to commit themselves to an unknown expenditure under the terms of a guaranteed revenue agreement.

LIGHTING SCHEMES

Barnes. The borough council has approved a £33,000 scheme for improved lighting on the main roads. It is proposed to use Radiovisor control equipment at certain junctions.

Brighouse. The Street Lighting Committee has agreed in principle to the conversion of street lighting in the borough from gas to electricity. There are now about 1,650 gas lamps in use.

Edinburgh. The Works Committee has approved estimates at £65,000 for new electric street lighting in the city and for housing areas.

Elgin. The council has approved in principle proposals submitted by the burgh surveyor for improved lighting in various roads at a cost of £3,765.

Kingswood. The U.D.C. has agreed to convert the present lighting in two main roads to fluorescent, at a cost of £3,700.

COMPANY ACTIVITIES

FOLLOWING the 400% bonus of a year ago, the preliminary profits of of the Decca Record group for the year to March last came as an anti-climax on the Stock Exchange and the shares fell from 38s. 9d. to 38s. Speculators are never satisfied. The consolidated trading profit rose by £110,000 to £1,300,000 and the dividend from 30% to 35%. It is a pity Sir Cyril F. Entwistle, who is chairman, doesn't change the name. While it is true there has been a big increase in the sale of gramophone records of the new type as well as the old, of which Decca is one of the leading U.K. manufacturers, Decca is also selling a growing number of television receivers. Less is known about its rapidly-growing trade in radar and marine navigator equipment.

The group is one of the pioneers in this field. It now has subsidiary companies throughout the world. The system is to hire out apparatus of the Decca Navigator, and to equip ships with marine radar. The company also undertakes a good export business and is earning a lot of dollars.

The City is not quite certain about the the object of hiving off 1s. of the 5s. Ordinary shares and issuing in its place a 5s. Preference share which will receive a dividend of 25% and be redeemable at £1. The idea seems to be to give shareholders an opportunity of taking the profit on part of their holdings, if they wish (the 5s. Preference will probably be worth about 20s. each), while still maintaining an unchanged proportion of the undertaking. They are also to get a valuable rights issue of 200,000 4s. Ordinary at 5s. each.

As far as dividend goes, I should still expect to see payment of at least 1s. 9d. a share next time, as now, which will provide a potential yield of just under 5½%, covered just over three times once E.P.L. is out of the way. That incidentally will not be yet because the next accounts go to March this year, which includes another nine months of the E.P.L. period.

Decca has never looked back since stockbroker Mr E. R. Lewis took a hand in the company's affairs during the war. Much of the credit for the company's prosperity and growing financial strength is due to his and Sir Cyril Entwistle's untiring efforts.

L. Sterne and Co. results for 1953 reveal, like those of other refrigerator manufacturers, the increased competition and rise in costs in that particular industry. We have recently had Marco Refrigerators just emerging from the "red." L. Sterne profits for the year to October last were only £235,000 compared with £302,000. Sir Samuel R. Beale, the chairman, has reduced the reserve allocation from £70,000 to £50,000.

Despite the set-back, there are favourable factors in the accounts. Current assets at £1,364,000 well exceed current liabilities of £562,000. There is a welcome reduction in stocks from £915,000 to £858,000 while debtors are down from £457,000 to £417,000. Cash has gone up from £3,500 to £89,065. Overdraft no longer ranks among the current liabilities, the final £15,628 having been written off during the past year.—*From our City Correspondent.*

Electrical and Industrial Investment

The net profit of this concern at £56,133 is £11,175 higher than for the previous year. The Deferred Ordinary dividend is 60%, double that of a year ago.

Elliott Brothers (London) Ltd.

Arising out of this company's acquisition of the assets and goodwill of Bristol's Instrument Co. (noted elsewhere), and in view of the bank overdraft, a meeting is called for 1 Mar. to increase the authorised capital from £500,000 to £750,000 and make possible an issue of 352,000 new 5s. Ordinary shares. These would be issued in the ratio of two new for five old. There is for the time being no intention to issue the balance of £292,000 of the authorised capital. The issue price has not been finally fixed, we understand. The bank overdraft stands at about £290,000.

M. Mole and Son

This metal stampings and die casting firm reports a net profit of £18,457 for the year ended 31 Dec. last. This compares with £16,026 for the previous year. The dividend is again 10% plus a bonus of 5%, as before.

R. B. Pullin and Co., Ltd.

With a final dividend of 10% the total distribution for the year ended 30 Sep. last is maintained at 15% on the Ordinary capital which was increased from £100,000 to £175,000 in June. The net profit before charging taxation is £98,703 for the year, compared with £89,265 for the previous period.

L. Sterne and Co., Ltd.

In his report accompanying the full accounts, the chairman, Sir Samuel R. Beale, states that reduced trading profit is the inevitable outcome of reduced sales, smaller profit margin owing to increased competition, and the steady rise in nearly all costs. The balance of orders unexecuted shows a further drop, he adds, but there has been some improvement in that respect since the close of the financial year.

Veritys Ltd.

The directors of this old-established concern have denied reports that it is to be acquired by another company. The Board state that no negotiations of any kind have been commenced in any direction or are contemplated.

Thomas W. Ward

It is proposed to make a scrip issue of one new Ordinary for each £1 share held, and to increase the capital to £4,000,000.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders, unless otherwise stated.

12 Feb.—Belfast T.C. Heating installation at power station East.—Advertised in 14 Jan. issue.

12 Feb.—Heckmondwike U.D.C. Installation in 36 houses on Dale Lane estate. —See 28 Jan. issue.

12 Feb.—Macclesfield. Electric lamps and fittings to some or all hospitals during 1954-55.—See 28 Jan. issue.

13 Feb.—Altrincham T.C. Concrete lighting columns for year ending 31 Mar., 1955.—See 21 Jan. issue.

13 Feb.—Brentwood U.D.C. Lamps required in year ending 31 Mar., 1955.—See 4 Feb. issue.

13 Feb.—Edinburgh T.C. Installation at Drylaw primary school.—See 28 Jan. issue.

13 Feb.—Huddersfield. Tungsten filament, mercury vapour and sodium lamps, cables, for year beginning 1 Apr.—See 21 Jan. issue.

13 Feb.—Manchester T.C. Annual maintenance of electrical equipment in schools and other premises.—See 28 Jan. issue.

13 Feb.—Stockport T.C. Lamps for schools for year ending 31 Mar., 1955.—See 21 Jan. issue.

15 Feb.—Dundalk. Supply and installation of fluorescent lighting and wiring in Technical Schools. J. V. Tierney and Co., consulting engineers, 15-16 Duke St, Dublin. Deposit £1. 1s.

15 Feb.—Gloucester T.C. Installation of electricity in Matson junior and infant school. J. V. Wall, city architect, Suffolk Hse, Greyfriars. Deposit £2. 2s.

15 Feb.—Haslemere U.D.C. Supply of street lighting equipment for group B sodium lighting. Engineer and Surveyor, Council Offices, Museum Hill.

15 Feb.—High Wycombe T.C. Street lighting along London-Fishguard trunk road (A.40).—Advertised in 28 Jan. issue.

15 Feb.—Northwich T.C. Lamps wanted during year beginning 1 Apr.—See 4 Feb. issue.

15 Feb.—Perthshire. Installation in 90 houses on nine sites. Apply by above date.—See 4 Feb. issue.

15 Feb.—Wallsend T.C. Installation of lighting and points in Central Schools, —See 4 Feb. issue.

16 Feb.—Downpatrick (Down) R.D.C. Installation in 12 houses at Ballysugagh. —See 4 Feb. issue.

16 Feb.—Peterborough T.C. Lighting and power installations in 100 houses on Dogsthorpe North estate. Apply by above date to F. J. Smith, City Engineer and Surveyor, Town Hall. Deposit £2. 2s.—Advertised in this issue.

16 Feb.—Poole T.C. Wiring supplies and accessories, lamps, street lighting equipment.—See 28 Jan. issue.

17 Feb.—Sutherland. Installation in Ross House Girls' Hostel.—See 4 Feb. issue.

18 Feb.—Kidsgrove U.D.C. Concrete columns, lamps, lanterns and accessories for street lighting on three estates.—See 4 Feb. issue.

18 Feb.—Kelso T.C. Installation in 82 prewar houses.—See 4 Feb. issue.

18 Feb.—Londonderry. Electricity Dept. requires supplies of cable, transformers, meters, cookers, lamps, street lighting columns, fittings, etc., time switches. Dept. is in Strand Rd.

20 Feb.—Bournemouth T.C. Street lighting columns; brackets; hardwood boards; fittings and lamps.—See 4 Feb. issue.

20 Feb.—Chadderton U.D.C. Supply of lamps in year from 1 Apr. Engineer and Surveyor, Town Hall.

20 Feb.—Exeter. Supply of lamps to all or any of 30 hospitals under Exeter and Mid-Devon, E. Devon, and Exeter Special Hospital Committees. Joint Purchasing Officer, Royal Devon and Exeter Hospital.

20 Feb.—Havant (Hants) U.D.C. Supply of cables and fittings for year from Apr. Engineer and Surveyor, Council Offices, Park Rd North.

20 Feb.—Higham Ferrers T.C. Street lighting in class B.—See 21 Jan. issue.

20 Feb.—Macclesfield T.C. Sodium street lighting along four roads.—Advertised in 4 Feb. issue.

22 Feb. — Bedlingtonshire. — Electrical goods during 1954-55.—See 28 Jan. issue.

22 Feb.—Northern Ireland. Electrical installation in 160 houses at Andersontown and 43 at Ahoghill. N.I. Housing Trust, 12 Hope St, Belfast. Deposit 10s. each scheme.

22 Feb.—Tynemouth T.C. Supply of lamps and cables, lamp columns, lanterns and fittings for year ending 31 Mar., 1955. D. M. O'Herlihy, 16 Northumberland Sq, North Shields.

22 Feb.—Yiewsley and W. Drayton U.D.C. Steel street lighting columns.—See 4 Feb. issue.

23 Feb.—Durham R.D.C. Electrical goods required for housing maintenance surveyor, Byland Lodge, Hawthorn Terr., Durham.

23 Feb.—N. Ireland. Supply of fitting, also electrical work, during year from 1 Apr. at Waveney Hospital, Ballymena. Secretary, Waveney Hospital.

24 Feb.—Clutton (Bristol) R.D.C. Installation in 20 houses at Publow.—See 4 Feb. issue.

24 Feb.—East Riding. Supply of lamps in year from 1 Apr. Supplies Officer, County Hall, Beverley.

25 Feb.—Dewsbury T.C. Street lighting equipment.—Advertised in 4 Feb. issue.

26 Feb.—Belfast T.C. Supply of (a) suspension and hoisting chains for cranes; and (b) condenser tubes and tube plate ferrules. Electricity Dept., East Bridge St.—Advertised in this issue.

26 Feb.—Carlow (Eire). Installation of internal telephone system in offices of Carlow County Council, Athy, Rd, Carlow. Details from E. J. McKenna, acting secretary at above address.

26 Feb.—Donegal. Installation in county hospital at Letterkenny.—See 4 Feb. issue.

26 Feb.—Westhoughton U.D.C. Supply of lamps during year from 1 Apr. F. H. Walker, Surveyor, Town Hall.

27 Feb.—Aireborough U.D.C. Street lighting along 3 streets.—Advertised in 4 Feb. issue.

27 Feb.—Edinburgh. Electrical services for year beginning 1 Apr. at Gogarburn M.D. Instn. Documents from Secretary, Gogarburn Instn., Corstorphine, Edinburgh.

27 Feb.—Irlam U.D.C. Supply of lamps during 1954-55.—See 4 Feb. issue.

27 Feb.—Merthyr Tydfil T.C. Supply of electrical goods in year beginning 1 Apr. Borough Engineer and Surveyor, Town Hall.

1 Mar.—Birkenhead T.C. Equipment for Technical Colleges.—See 28 Jan. issue.

1 Mar.—Leeds T.C. Supply of lamps in year ending 31 Mar., 1955. A. B. Findlay, general manager transport dept., 1 Swinegate.

2 Mar.—Farnborough (Hants) U.D.C. Supply of three 5 in. centrifugal fullway

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 105 queries answered this week

"Gainsborough" fires, makers of? E.B. —Two concerns have made fires under this name: Premier Electric Heaters Ltd., Crown House, Aldwych, W.C.2; Dowsing Co. (Electrical Manufacturers) Ltd., Kangley Bridge Rd, S.E.26.

"Ajax" hairdryers, repairers of? Y.E.B. —Osborne Garrett and Co., Ltd., 51 Frith St, W.1.

Electrically-heated bedjackets, makers of? E.E.I.—Inferation Ltd., 11 Old Bond St, W.1.

"English Rose" refrigerators, makers of? T.E.—C. S. A. Industries Ltd., Wharf Rd, Warwick.

"Lewsew" sewing machine motors, makers of? L.E.B.—Lewis and Lewis, 112 Gt Portland St, W.1.

"Superlux" lighting fittings, makers of? A.W.—Stormlight Electrical Co., Ltd., 160/164 Mile End Rd, E.1; and General Electric Co., Ltd., Magnet House, Kingsway, W.C.2; have both produced fittings using this name.

"Handy Angle" slotted angle iron, makers of? W.W.—Handy Angle Ltd., Nine Locks, Brierley Hill, Staffs.

ANSWER WANTED

"Cygnet" irons, makers of? E.E.B.

vertical spindle sewage pumps with squirrel cage 3-phase electrical motors, starters, control panels and switchgear. Also standby plant at Cove sewage works. Engineer and Surveyor, Town Hall.—Advertised in this issue.

3 Mar.—N. Ireland. Electrical installation in Min. of Commerce Advance Factory at Dungannon. Ministry, Chichester Hse, (Room 28), Chichester St, Belfast. Deposit £3. 3s.

5 Mar.—Belfast T.C. Seven 220,000 lb/hr stoker fired boiler units and other plant for power station West.—Advertised in 31 Dec. issue.

5 Mar.—Belfast T.C. Feed heating and condensing plant sets; and piping, steam receivers and associated valves, electrical controls, fittings, etc.—Advertised in 7 Jan. issue.

5 Mar.—Wiltshire. Installation in divisional police headquarters at Salisbury.—Applications by 12 Feb.—See 4 Feb. issue.

8 Mar.—Dublin. Wiring at Dr Steevens' Hospital.—See 4 Feb. issue.

10 Mar.—Leeds. Electrical works at Hull Royal Infirmary. Applications by 6 Feb.—See 28 Jan. issue.

13 Mar.—Airdrie T.C. Supply of lamps during year from 16 May.—Details from Town Clerk.

13 Mar.—Dublin. Supply and installation of two horizontal centrifugal high lift, and two similar low lift, pumps, for electric motors, etc. E. R. Ryan, consulting engineer, 1 Montpelier Terr., Galway. Deposit £5. 5s.

24 Mar.—Ilford T.C. Pumps, motors and other equipment for sewage at pumping station.—Advertised in 4 Feb. issue.

26 Mar.—Belfast T.C. Two sets of central evaporating plant for power station West.—Advertised in 28 Jan. issue.

No date stated—N. of Scotland H.E. Board. Transmission line from Fort Augustus to Fort William.—Advertised in 4 Feb. issue.

No date stated—Jarrow T.C. Supply of electrical materials for housing during year from 1 Apr. Borough Engineer, Town Hall.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Road, W.C.1, quoting reference.*

4 Mar.—Formosa. Supply of 5 sets of 75 kVA auto-transformers and other electrical equipment for Central Trust of China, U.S. Aid Div., c/o Po Ai Rd, Taipei, Taiwan. B.o.T. (Ref. ESB 2699/54)*.

5 Mar.—South Africa. Supply and erection of one 7-panel metalclad switchboard, 33 kV, 1,000 MVA breaking capacity single bus-bar, remote electrically operated, in two sections. (Tender No. E 2463). Town Clerk, Municipal Buildings, West St, Durban. B.o.T. (Ref.: ESB 1903/54).*

11 Mar.—New Zealand. Supply of total of 12,320 yd switchboard wire, P.V.C. silk covered and lacquered in various conductor sizes. (Tender P.S.S. 149.) Post and Telegraph Dept. B.o.T. (Ref.: ESB 2785/54).*

12 Mar.—South Africa. Manufacture and supply of two outdoor type circuit-breakers 750 MVA, 33 kV, and six 33 kV 3-phase outdoor air break switches not less than 300 amp current carrying capacity. (Contract E. 2477.) Durban Electricity Dept., Alice St, Durban. B.o.T. (Ref.: ESB 2571/54).*

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 9 February

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	229	+2½	285
„ (3 months)	214	+½	—
LEAD, refined pig, min. 99·97% purity (cash)	82⅜	−1½	94⅜
„ (3 months)	81⅛	−2⅛	92⅝
TIN, refined, min. 99·75% purity (settlement)	660	+5	969
„ (3 months)	636	+1	941½
ALUMINIUM, ingots 99-99·5%	156	—	166
ZINC, virgin, min. 98% purity (cash)	74½	+2	82½
„ (3 months)	72⅜	+1⅛	82$\frac{7}{16}$
RUBBER No. 1, RSS, spot (per lb.)	16½d.	−⅛d.	21½d.
„ c.i.f. basis, ports, Apr. (per lb.)	16$\frac{9}{16}$d.	−$\frac{3}{16}$d.	22⅜d.
ARMOURING:			
Galv. Steel Wire (0·104 in.)	51½	—	51½
Mild Steel Tape (0·014 in.)	40	—	39½

15 Mar.—Canada. Supply and installation at Brandon, Manitoba, power station of two 30,000 kW steam turbo-generator sets, and possibly a third later. Each should have rating of 35,294 kVA at 0·5 psig hydrogen pressure, 0·85 power factor, 13,800 V, 3-phase, 60 c/s. Manitoba Hydro-Electric Board, Electric Railway Chambers (10th floor), Winnipeg. B.o.T. (Ref.: CRE 1031/54).*

16 Mar.—Brazil. Supply of 7 transformer substations, fully equipped, covered-in, to stand in open, in tropical conditions, comprising transformers, lightning conductors, circuit-breakers, control panel and spares; an automatic voltage regulator; and another transformer. Comissao Estadual de Energa Electrica, Edificio da Prefeitura, Porto Alegre, Rio Grande do Sul. B.o.T. (Ref: ESB 1023/54).*

26 Mar.—New Zealand. Supply of 11 kV and 33 kV switchgear for Waitemata Electric Power Board, 81 Albert St, Auckland. B.o.T. (Ref.: ESB 1863/54).*

11 June—New Zealand. Waitemata Electric Power Board invite tenders for supply of three 10 MVA and five 7·5 MVA double-wound transformers. Board is at 81 Albert St, Auckland. B.o.T. (Ref.: ESB 1862/54).*

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Columax. 724,179/7915S. Class 9. Permanent magnets. James Neill and Co. (Sheffield) Ltd., Napier St, Sheffield 11.

Ironclad. B720,065. Class 9. Electric accumulators for export. Chloride Electrical Storage Co., Ltd., Exide Works, Clifton Junction, near Manchester.

Permionic, 721,166, and **Permaplex,** 721,168. Class 9. Electrolytic cells and diaphragms for use therein. Permutit Co., Ltd., Permutit House, Gunnersbury Ave, W.4.

Dimalarm. B723,221. Class 9. Alarms and alarm systems. W. F. Chipperfield, 184 Kingsway, Gatley, Ches.

Maxcess. 724,120. Class II. Fans, fan cases, ventilators, etc. Woods of Colchester Ltd., Braiswick Works, Colchester.

Harboseal. 724,612. Class 17. Materials and preparations for packing, sealing and electrical insulation purposes. Harbutt's Plasticene Ltd., Plasticene Works and Studio, High St, Brampton, Bath.

Contracts Placed

Croydon T.C. Renewal of wiring at Selhurst grammar school for girls, Girdlestone and Co., Ltd., £1,858; same at the school for boys, Troughton and Young Ltd., £2,056.

Ealing T.C. Street lighting in Western Ave, lanterns, British Thomson-Houston Ltd., £2,245 steel columns, Stewarts and Lloyds Ltd., £559; concrete columns, B.T.H. (£294) and Concrete Utilities Ltd. (£684); supply and installation, Southern Electricity Board, £6,700; erection of columns, B.T.H., £925.

Frome (Som.) U.D.C. Electrical installation in 64 houses. Frome Central Electrical Contractors, £2,340.

Hartley Wintney (Hants.) R.D.C. Wiring of 172 pre-war council houses, W. P. Bond, £2,604.

Hendon T.C. Electrical work in Spur Rd housing scheme, Eastern Electricity Board, £4,346.

Heston and Isleworth T.C. Provision of improved street lighting along Bath Rd, Revo Electric Co., Ltd., £5,339.

Hull T.C. Electrical installation in 200 houses on Longhill estate, Booker and Tarran Ltd.

Kensington B.C. Supply of 75 street lighting columns, General Electric Co., £1,881.

London. Provision of broadcasting equipment for comprehensive schools, Clarke and Smith Manufacturing Co., Ltd., £8,569.

Longbenton U.D.C. Electrical installation in houses at Forest Hall, in 228 houses, J. G. Patton; and in 82 houses, A. F. Jenison.

Newcastle-on-Tyne T.C. Conversion from gas to electricity in 97 houses on Fergusons Lane estate, 103 on Benwell Dene estate, 208 flats on Deleval Rd estate and 84 flats at Leazes Dwellings. J. and D. Ellison Ltd.; similar work in 473 dwellings on Cowgate estate, Bernard Berrie (Newcastle) Ltd.

Ripon T.C. Lamp standards and equipment for street lighting in North Rd, Revo Electric Co., Ltd., £2,112.

Stoke Newington. Supply and installation of two 250 kW mercury arc rectifier equipment at M.W.B. waterworks. General Electric Co., £8,268.

Stoke-on-Trent. Rewiring at Chest Dispensary, Shelton, Girdlestone and Co., Ltd., £4,205.

Wednesbury T.C. Supply and erection of tungsten lamps on Millfields estate, Midlands Electricity Board, £2,650.

BUSINESS PROSPECTS

Home

Airdrie T.C. Tenders to be invited for erection of burgh police headquarters to cost about £652,270.

Ashington (Northumb.) Northern (N. and C.) Coal Board of Newcastle, expect to start work soon on construction of engineering workshops costing some £350,000.

Barnet U.D.C. Plans approved for erection of 101 dwellings on Whitings Hill estate.

Barnsley T.C. Erection of first of four instalments of extensions to Mining and Technical College. Estimated cost of present proposal is £135,000. H. E. Redburn, Director of Educ., Education Dept., Town Hall.

Barrow-in-Furness T.C. Construction of 107 dwellings on Abbotsmead estate. J. N. Flitcroft, borough engineer and surveyor, Town Hall.

Blackpool T.C. Construction of Marton secondary modern school to begin next month. A. Hamilton, borough surveyor, Municipal Buildings.

Bromsgrove. Birmingham Hospital Board recommended to approve provision of electricity from Grid to Barnsley Hall Hospital. Estimated cost, £5,000.

Bridge-Blean (Kent) R.D.C. Erection of 28 houses on Broad Oak site, Sturry. Council Offices, Old Dover Rd, Canterbury.

Blyth (Northumb.) T.C. Tenders to be invited in connection with electrification of 349 houses. Borough engineer is D. W. Foster.

Chester R.D.C. Construction of 28 houses at Christleton. T. C. R. Eaton, architect, 16 White Friars, Chester.

Corby (Northants) U.D.C. It is proposed to build 11 shops with flats at estimated cost of £56,500.

Exeter. Pollard and Co., Ltd., printers, propose to rebuild works on inner bypass road. Their Southernhay Gardens premises were destroyed in the war.

Gleadless (Derby). New Anglican church and hall costing about £10,500 to be built on Basegreen estate.

Houghton-le-Spring U.D.C. Plans approved for erection of 252 houses at Houghton Burn.

Hexham. Calor Gas Ltd. are to convert former Central Methodist Church into showroom and offices.

Holt (Norf.). G. T. Redgment, 76 Prince of Wales Rd, Norwich, will probably be consulting engineer for E. Anglian Hospital Board's electrical reorganisation of Kelling Sanatorium.

Islington B.C. Construction of 10- and 4-storey blocks of flats containing 98 dwellings in Dame St. Town Clerk. Islington Town Hall, Upper St, N.1.

Leicester T.C. Scheme being considered for erection of secondary school in Springfield Lane.

Lewisham B.C. Approval sought for scheme by P. Monro, architect, 32 Gooms Hill, S.E.10, for erection of primary school in Tewkesbury area. Estimated cost is £88,383.

Liverpool. Plans approved for R.C. infant school at Southdene. Application to be made to borrow £292,525 for erection of Bankfield and Arnot St secondary modern schools; and £72,000 for new building at S. L. Calder College on Dowesfield estate.

London. Metropolitan Water Board has approved installation of tubular lighting above glass roof of Revenue Hall, New River Head. Estimated cost is £3,750.

Middlesbrough T.C. Erection of (a) Middle Beck No. 2 secondary school in Ormesby Rd., and (b) Longlands county college in Douglas St. Director of Educ., Education Offices, Woodlands Rd.

Sheffield T.C. Construction of Hinde Hse. and Silverdale secondary modern schools. J. L. Wolmersley, city architect, Town Hall.

Stockton-on-Tees. Cordingley and McIntyre, The College, Durham, are architects for church, hall and vicarage in Ragworth Lane for Durham Diocesan Board of Finance.

Torquay T.C. It is proposed to build factory costing £100,000 and lease it to British Van Heusen Co., Ltd.

Walton and Weybridge U.D.C. Erection of 22 houses on Sunnyside estate. Engineer and Surveyor. Council Offices, Walton-on-Thames.

Wandsworth. Scheme submitted to L.C.C. for erection of primary school at Wimbledon Park site. Cost estimated at £108,615.

Woolwich. Scheme in hand for erection of large secondary school for girls and boys at Avery Hill. Cost estimated at £575,060.

Whitby Bay U.D.C. Tenders to be invited for installation of electricity in about 200 houses at cost of about £6,400. E. Roberts, Surveyor, Council Offices.

Zetland. Construction of 50 houses on six sites in Landward housing scheme. County Architect, 92 St. Olaf St, Lerwick.

Overseas

Cuba. Offers invited from U.K. manufacturers of small electric motors up to 1 h.p. by Juan Miguel Fernandez Ramos, Avenoda de Italia 209, Havana. They are to replace worn out motors on American refrigerator equipment.

Lebanon. Maison Laina, Rue de la Bourse, Beirut, are interested in hearing from U.K. manufacturers requiring representation of non-industrial electrical material—radios, lighting equipment, fittings, irons, washing machines, etc.

Trade Notes

Acquisition. To develop its interest in the manufacture of process control apparatus, Elliott Brothers (London) Ltd. have acquired the assets and goodwill of Bristol's Instrument Co., of Weymouth, and entered into a licence agreement with the Bristol Co. of U.S.A. The acquisition and the arrangement with the American company should, it is stated, enable Elliott's to effect considerable economies in development and production costs and to expand in the process control field.

Change of Address. The London office of Bruce Peebles and Co., Ltd., has moved to 54 Victoria Street, S.W.1. Telephone: Tate Gallery 3551/4.

Indian Import Quotas. The Indian Ministry of Commerce and Industry has announced that importers will now be allowed to choose the financial year 1952-53 as a basic period for the import of certain goods, including electric motor starters, control gear, transmission gear and electric horns.

Gazette Announcements

COMPANIES ACTS

Voluntary Liquidation.

Linton (London) Ltd. Resolution for voluntary liquidation passed at meeting on 27 Jan. At statutory meeting of creditors, statement of affairs showed liabilities £3,049, of which £1,491 was due to trade creditors; £156 expense creditors; £962 in respect of loans; and £438 to Bank. Assets of book value of £1,127 estimated to produce £568 and after allowing £417 for preferential claims, there were net assets of £151, or deficiency as regards creditors of £2,897.

After brief discussion resolution passed by creditors confirming voluntary liquidation with Mr P. Phillips, of 76 New Cavendish St, W.1, as liquidator, with committee of inspection.

Rodway Jones and Co., Ltd. Meetings of creditors and contributories at Inveresk Hse. (Room 401), 346 Strand, W.C.2, on 17 Feb. at 3.30 p.m. and 4 p.m.

Nickols and Hoff Ltd. Resolution for voluntary winding-up passed at meeting on 25 Jan. J. Hancock, C.A., Montgomery Chambers, Hartshead, Camps Lane, Sheffield, was appointed liquidator.

Tuckers Radio Service Ltd. N. W. Osborne, 11-12 Finsbury Sq., E.C.2, has been appointed liquidator by creditors.

C.M.C. (Switchmatic) Ltd. Meetings of creditors and contributories will be held at offices of A. E. Orbell and Co., cert, acc., 7 Old Steine, Brighton, on 11 Mar. at 4 p.m. and 4.15 p.m. to receive liquidator's report.

BANKRUPTCY ACTS

First Meetings

Bradford. Clifford W. Wainwright, trading as C. Cliff and Co., at 111 Gelderd Rd, Holbeck; with another as Speedwell Electric Co., at 68 Domestic St, Holbeck; in partnership as Smith's Cleaners and Express Cleaners at Lr. Wortley and Burtley; as Renew Radio at Lr. Wortley; in partnership as E. Murray and Co., at 96 Dixon Lane, Leeds; and as Wainwright and Bailey, at 10 Victoria Rd, Pudsey (address named in receiving order), and Hough Side Rd, Pudsey. First meeting takes place at Official Receiver's Office, 20 North Parade, Bradford, today (Thurs.) at 11 a.m. Public examination at County Court House, Manor Row, Bradford, on 6 Apr. at 10.30 a.m.

Luton. Hugh Brown, electrical engineer trading at 109a Park St., Luton. Meeting at Official Receiver's Office, 6 The Parade, Northampton, on 15 Feb. at 11.30 a.m., and public exam. at Court Hse., Stuart St., Luton, on 11 Mar. at 11 a.m.

Release of Trustee

Cardiff. Frederick J. Hocken, trading as Auto-Electric Services, at 3 Vere St., Cadoxton, Barry. Trustee was R. Betts, Official Receiver, 34 Park Pl., Cardiff.

Intended Dividends

York. Edwin Vasey, electrician, of 21 Bridge Rd., Bishopthorpe, York. Last day for receiving proofs, 20 Feb. Trustee is W. H. Meredith, Official Receiver, 29 East Pde., Leeds.

MEETINGS TO NOTE

THURSDAY, 11 FEB.

I.E.S. (Manchester).—"Lighting for Enjoyment," T. O. Freeth. Elect. Offices, Town Hall Extension, 6 p.m.

E.P.E.A. (Merseyside).—"Safety Precautions in Electric Supply Industry," L. A. Corney. Elect. Offices, Whitechapel, Liverpool, 7 p.m.

Soc. of Instrument Technology.—"Automatic Combustion Control," J. C. Farquhar. Manson Hse., Portland Place, W.1, 7 p.m.

Inst. of Welding (Slough).—"Resistance Welding in Production," E. A. Whittaker. Community Centre, Farnham Rd, 7.30 p.m.

Incorp. Plant Engineers (N.-East).—"Metallurgy," J. Rolston. Roadway Hse., Oxford St, Newcastle, 7 p.m.

I.E.E. (London).—"Modern Review of Fundamental Electromagnetic Theory," P. Hammond. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N. Scotland).—"Fluorescent Discharge-Tube Circuits and Operating Problems," J. Cates. Royal Hotel, Dundee, 7 p.m.

I.E.E. (S. Western).—"Printed and Potted Electronic Circuits," G. W. A. Dummer and D. L. Johnston. Dowlish Ford Mills, Ilminster, 4.30 p.m.

I.E.E. (Swansea).—Discussion on "Automatic Control," Prof D. N. Cass-Beggs. Public Library, Alexandra Rd, 6 p.m.

I.E.E. (London Students).—"Industrial Consumer Installation Practice," J. J. Peacock. Public Library, Chelmsford, 7 p.m.

FRIDAY, 12 FEB.

Jnr. Instn. of Engineers (London).—"Steam Utilisation and Heat Conservation," L. Clegg, Townsend Hse., Greycoat Place, S.W.1, 7 p.m.

I.E.S. (Bradford).—"Lighting for Enjoyment," T. O. Freeth. Elect. Offices, 45-53 Sunbridge Rd, 7.30 p.m.

Television Soc.—Fleming Memorial lecture on "Colour TV," G. G. Gouriet, Royal Instn., Albemarle St, W.1, 7 p.m.

I.E.E. (N. Staffs).—Annual dinner at Crown Hotel, Stone, 7 p.m.

I.E.E. (London Students).—Conversazione and Dance at Savoy Place, W.C.2, 6.30 p.m.

MONDAY, 15 FEB.

Birmingham Electric Club.—"Generators for Water Power Plants," E. M. Johnson and C. P. Holder.

I.E.E. (London Educ.)—Discussion on "Teaching the Subject of Insulating Materials," Willis Jackson. Savoy Place, W.C.2, 6 p.m.

I.E.E. (Mersey and N. Wales).—"Plan for Electricity," G. K. Alston. Liverpool Royal Instn., Colquitt St, 6.30 p.m.

I.E.E. (N.E. Radio and Measurements).—"Technical Arrangements for Sound and TV Broadcasts of Coronation," W. S. Proctor, N. J. L. Pulling and F. Williams. King's College, Newcastle, 6.15 p.m.

I.E.E. (Western Supply).—"Assessment of Impregnated Pressure Cable," L. G. Brazier, D. T. Hollingsworth and A. L. Williams. Elect. House, Colston Ave, Bristol, 6 p.m.

A.S.E.E. (Bournemouth). — "Electronic Control." G. L. G. Jeans. Grand Hotel, Firvale Rd, 8.15 p.m.

Ipswich Electrical Assoc. — Open Forum at Electric House, Ipswich, 6.30 p.m.

TUESDAY, 16 FEB.

I.E.S. (Liverpool). — "Application of Fluorescent Tubes in Transport Lighting," S. Anderson. Elect. Offices, Whitechapel, 6 p.m.

A.S.E.E. (London).—"Engineer in Management," H. Bainbridge.

I.E.E. (London).—Faraday Lecture on "Electro-Heat and Prosperity," O. W. Humphreys. Central Hall, Westminster, 6 p.m.

I.E.E. (E. Midland).—"Design Features of Certain British Power Stations," S. D. Whetman and A. E. Powell. Gas Offices, Nottingham, 6.30 p.m.

I.E.E. (Cambridge Radio Group).—"Use of Radio in Ascent of Everest," G. C. Band. Cambridgeshire Tech. College, Cambridge, 6.30 p.m.

I.E.E. (N. Midland Utilisation).—"Electricity in Farm Crop-Drying," C. A. Cameron-Brown. Elect. Offices, 1 Whitehall Rd, Leeds, 6.30 p.m.

I.E.E. (N.W. Utilisation).—"Electric Lifts in Post-War Housing," C. G. L. Morley. Engineers Club, Albert Sq, Manchester, 6.15 p.m.

I.E.E. (S.E. Scotland).—Discussion on "Town Planning with reference to the Electrical Engineer," T. T. Hewitson. Heriot-Watt College, Edinburgh, 7 p.m.

I.E.E. (Rugby).—"Electricity in the Wool Textile Industry," A. J. Francis and T. H. Carr. College of Tech. and Arts, 6.30 p.m.

I.E.E. (London Students).—"Development of Electrical Aids in A.A. Gunnery," D. H. A. Huddart, R.E.M.E. Training Centre, Arborfield, Berks.

A.S.E.E. (Portsmouth).—Lecture at B.E.A. Conference Rooms in High St, Old Portsmouth, at 7.30 p.m.

WEDNESDAY, 17 FEB.

I.E.S. (N. Lancs).—"Short Investigation into Stroboscopic Effect," E. Smith. Elect. Offices, 19 Friargate, Preston, 7.15 p.m.

I.E.S. (Tees-side).—"Airport Lighting," H. M. Ferguson. Cleveland Scientific and Tech. Inst., Corporation Rd., Middlesbro', 6.30 p.m.

Brit. Instn. of Radio Engineers (London).—"Electronics in Film Making," W. D. Kemp and B. R. Greenhead, School of Hygiene, Keppel St, W.C.1, 6.30 p.m.

Incorp. Plant Engineers (Glasgow).—"Industrial Lighting," F. H. Fielder. Building Centre, 425 Sauchiehall St, 7 p.m.

Incorp. Plant Engineers (Western).—"Generation of Industrial Power from Process Steam," E. G. Ritchie. Grand Hotel, Bristol, 7.15 p.m.

I.E.E. (Sheffield). — "Technique and Development of Automatic Winding in Mine Shafts," B. L. Metcalfe and G. Cuttle. Grand Hotel, 6.30 p.m.

I.E.E. (N.W. Radio).—"Reproduction of Signals Recorded on Magnetic Tape," E. D. Daniel and P. E. Axon. Engineers Club, Albert Sq, Manchester, 6.30 p.m.

I.E.E. (Oxford).—"Maintenance Engineer Atomised," J. R. Catlin. Elect. Offices, 37 George St, 7 p.m.

A.S.E.E. (Manchester).—"Members Problems." Engineers Club, Albert Sq, 7.30 p.m.

A.S.E.E. (Nottingham).—"Problems in Modern Light Control." H. E. Baxter and J. McEnery. Elect. Offices, Smithy Row, 7.30 p.m.

A.S.E.E. (Southampton).—Lecturettes at Polygon Hotel, 8.15 p.m.

A.S.E.E. (S. Wales).—Films at Min. of Labour, Westgate St, Cardiff, 7 p.m.

A.S.E.E. (S.W. London).—"Electric Water Heating." L. L. Hughes. Guild House, 32 Worple Rd, Wimbledon, 8.15 p.m.

THURSDAY, 18 FEB.

Incorp. Plant Engineers (Blackburn).—"Fire Protection for Industrial Buildings," A. Jackson. Grosvenor Hotel, Lord St, 7.30 p.m.

I.E.E. (London Utilisation).—"Electronic Motor Control," A. O. Dalton; "Arc-Quenching Circuits," B. T. Stonehouse, "Survey of the Principles of the Contact Rectifier," D. R. Smith. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (E. Midland).—"Overhead Distribution," H. W. Grimmitt. George Hotel, Kettering, 7.30 p.m.

I.E.E. (Southern).—Faraday lecture on "Electro-Heat and Prosperity," O. W. Humphreys. Guildhall, Southampton, 6.30 p.m.

I.E.E. (Irish).—"Physics of Nuclear Energy Release," Prof E. T. S. Walton. Trinity College, Dublin, 6 p.m.

A.S.E.E. (Kent).—Lecture at Bridge Cafe, 32 High St, Tonbridge, 8 p.m.

FRIDAY, 19 FEB.

I.E.E. (N. Staffs).—"Modern Review of Fundamental Electromagnetic Theory," P. Hammond. Duncan Hall, Stone, 7 p.m.

Elect. Trades Commercial Travellers' Assoc.—Annual luncheon at Connaught Rooms, W.C.2, 12.15 p.m.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

A.G.M. Electric Wholesale Ltd., 35 Hartington Rd, W. Ealing, W.13. Nom. cap.: £5,000. Dirs.: A. G. Mead, F. L. Holt, and J. W. Bucknell.

Alaska Manufacturing Co., Ltd., Martins Bank Chambers, Nelson, Lancs. Manufacturers of and dealers in electrical, refrigeration and engineering articles and equipment, etc. Nom. cap.: £1,000. Dirs.: H. W. Gore, H. Salmond, W. W. Riber, G. E. H. Briers, W. C. Ericsson, and D. Schildbach.

Nuttall Oilfield Supply Ltd., 3 Oxford St, W.1. Manufacturers of and dealers in boilers, turbines, winding engines, haulage plant and equipment for use in petroleum and oil industries, etc. Nom. cap.: £1,000. Dirs.: H. E. Hassett and K. H. Rothenberg.

Coolmota Ltd., Sterte Av, Poole, Dorset. Refrigeration and cold storage engineers, etc. Nom. cap.: £5,000. Dirs.: F. E. Owen and F. L. Miller.

Edward Onions Ltd., 4 Martin Rd, Tipton, Staffs. To take over business carried on at Tipton by Edwin Onions, electrical contractors and manufacturers, etc. Nom. cap.: £100. Dirs.: E. Onions, Dorothy E. Onions, and S. W. Nettles.

Dornier Machinery Co., Ltd., 14 Queen Victoria St, E.C.4. Mechanical, electrical and general engineers, etc. Nom. cap.: £100. Dirs.: R. Roadnight, Ellen C. Roadnight, F. L. Butler, and Esther E. A. Butler.

H. E. Dawson Ltd., 319 High Holborn, W.C.1. Constructional, electrical, mechanical and general engineers, etc. Nom. cap.: £100. Dirs.: H. E. Dawson, B. W. Davies, W. H. Earley, and L. G. Coleman.

R. H. Dent (Electrical) Ltd., 67 Bridge St, Manchester 3. To take over business of electrical wholesaler carried on as "R. H. Dent" by Jenny Dent at Manchester. Nom. cap.: £8,000. Dirs.: Miss J. Dent, F. D. Dent, W. G. Dent, and H. Nish.

Arabian Electrical Co. (Kuwait) Ltd., Clock House, Arundel St, W.C.2. Electrical engineers, engineers' agents, etc. Nom. cap.: £100. Dirs.: M. C. Jones and R. G. Watts.

A. D. Camp Ltd., 42 Oldham Rd, Failsworth, Lancs. To take over from Alwyn D. Camp, registered electrical contracting and television and radio service engineering business formerly carried on by him at 8 Oscar St, Moston, and 42 Oldham Rd, Failsworth. Nom. cap.: £1,000. Dirs.: A. D. Camp and W. G. Woolham.

ROBUST

yet sensitive..

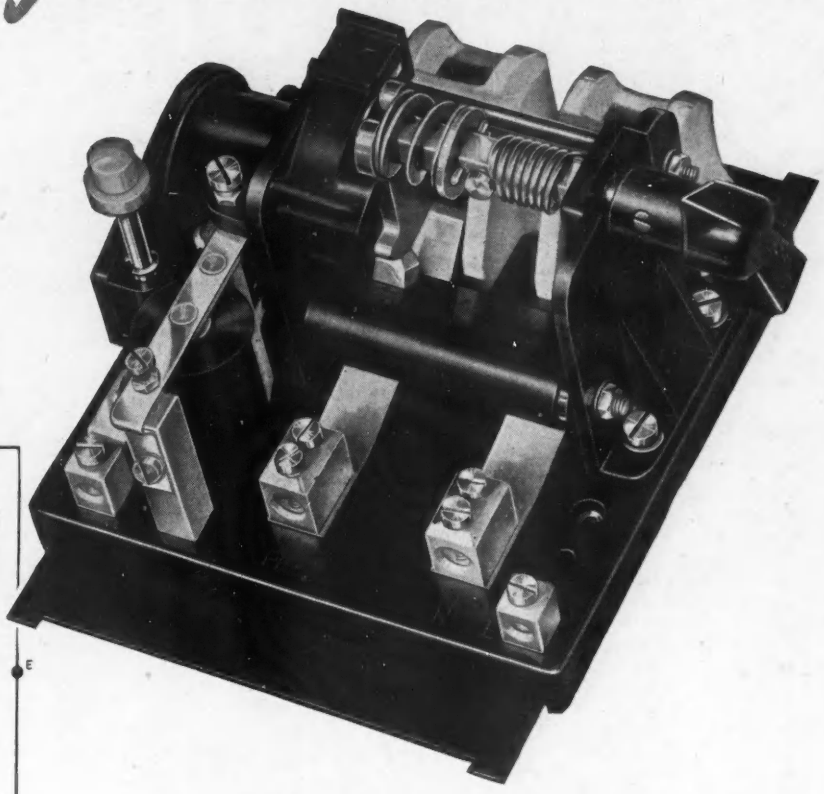
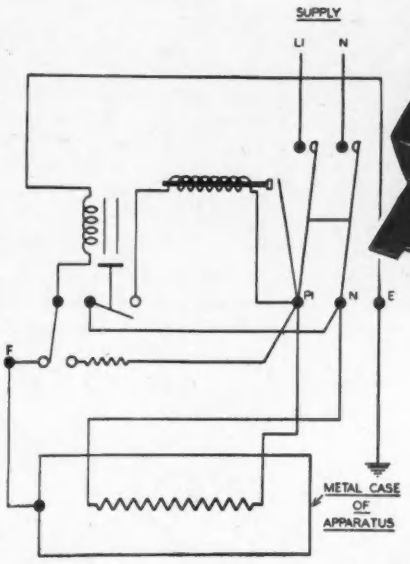


DIAGRAM OF CONNECTIONS:



The design of the HENLEY Earth-Leakage Circuit-Breaker incorporates an entirely new method of operation with a complete absence of toggles and delicate mechanism. The full mains voltage is utilized to operate the Circuit-Breaker by means of an integral relay system. Complies with B.S.842-1939. Full details in Booklet 53/B.

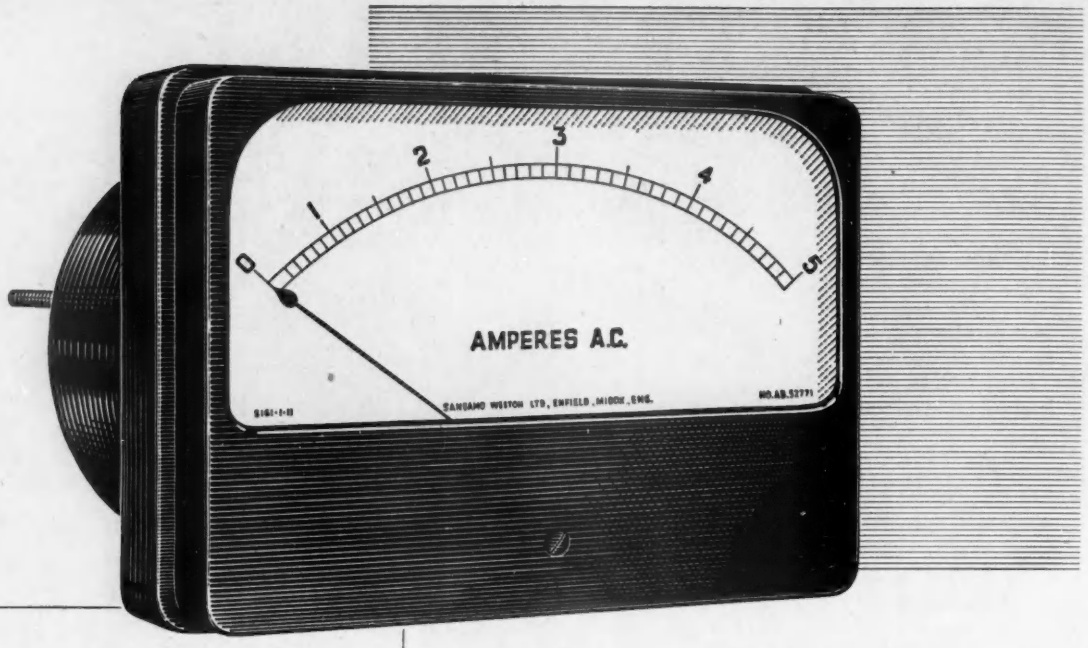
Delivery from stock

HENLEY

EARTH-LEAKAGE CIRCUIT-BREAKERS

(VOLTAGE OPERATED)

W.T.HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN, LONDON, E.C.1



WESTON ELECTRICAL INSTRUMENTS INCLUDE:–

LABORATORY STANDARDS

SUB STANDARDS

FIRST GRADE PORTABLE INSTRUMENTS

ROUND, RECTANGULAR AND EDGEWISE SWITCHBOARD AND PANEL INSTRUMENTS

PORTABLE TEST SETS

RELAYS

AIRCRAFT INSTRUMENTS

THE WESTON RANGE OF RECTANGULAR INSTRUMENTS

These instruments, giving the advantage of long, easily read scales, are designed to harmonize with rectangular panels and are offered in a variety of types and scale ranges.

Supplied as D.C. moving coil, A.C. rectifier and H.F. thermocouple types; also A.C./D.C. moving iron types.

Four sizes are available with scale lengths of 2·5″, 3·2″, 4·2″ and 6·25″.

Front of panel or back of panel mounting may be adopted as desired and if the former method is used, there is complete interchangeability with existing round models.

The 3·2″ and 4·2″ scale instruments are available with either illuminated or non-illuminated dials; the 2·5″ and 6·25″ scale instruments being available only with non-illuminated dials.

WESTON

Measuring Instruments

SANGAMO WESTON LIMITED

ENFIELD · MIDDLESEX

Tel: Enfield 3434 (6 lines) & 1242 (6 lines) Grams: Sanwest, Enfield

Scottish Factory: Port Glasgow, Renfrewshire. Port Glasgow 41151

Branches: London, CHAncery 4971 · Glasgow, Central 6208 · Manchester, Central 7904 · Newcastle-on-Tyne, Newcastle 26867 · Leeds, Leeds 30867 · Liverpool, Central 0230 · Wolverhampton, Wolverhampton 21912 Nottingham, Nottingham 42403 · Bristol, Bristol 21781 · Southampton, Soton 3328 · Brighton, Brighton 28497

CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

TENDERS INVITED

CITY OF BELFAST
Electricity Department

CHAINS FOR CRANES, CONDENSER TUBES AND FERRULES

TENDERS are invited for the supply and delivery of:

(*a*) Suspension and hoisting chains for cranes (Specification No. W.29).

(*b*) Condenser tubes and tube plate ferrules (Specification No. W.30).

Forms of Tender and specifications may be obtained at the Electricity Department, East Bridge St, Belfast.

Each Tender, in sealed envelope marked "Tender for ..... Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on FRIDAY, 26 FEB., 1954.

An official receipt must be obtained for each Tender delivered by hand. Tenders sent by post should be registered.

The lowest or any Tender will not necessarily be accepted.

City Hall,, JOHN DUNLOP,
Belfast. Town Clerk.
6 Feb., 1954. (G 603)

FARNBOROUGH URBAN DISTRICT COUNCIL

COVE SEWAGE WORKS
NEW PUMPING STATION

TENDERS are invited for three 5 in. centrifugal fullway vertical spindle sewage pumps (or stereophagus) together with squirrel cage 3-phase electric motors (approximately 17 b.h.p.) starters, control panels, and float or "No-Flote" switchgear. Also one 5 in. ditto pump with diesel motive power as Standby Plant.

Full Specification, Form of Tender, and Drawings can be obtained, on application, from the Council's Engineer and Surveyor, Town Hall, Farnborough, Hants.

Tenders to be submitted to the undersigned not later than 12 noon on Tuesday, 2 Mar., 1954.

The Council do not bind themselves to accept the lowest or any Tender.

D. STUART JONES,
Town Hall, Clerk of the Council.
Farnborough, Hants.
4 Feb., 1954. (G 605)

CITY OF PETERBOROUGH

THE Council invites tenders from recognised electrical contractors for the electric lighting and power installations to 100 permanent houses on the Dogsthorpe North Estate, Peterborough.

Drawings, specifications and forms of tender may be obtained on application to Mr F. J. Smith, M.B.E., A.M.I.C.E., City Engineer and Surveyor, Town Hall, Peterborough.

Applications, before noon on Tuesday, 16 Feb., 1954, should be accompanied by a cheque for £2. 2s. made payable to the Peterborough City Council. This will be returned on receipt of a bona fide tender or the return of the documents.

C. PETER CLARKE,
Town Hall, Town Clerk.
Peterborough. (G 550)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

LONDON ELECTRICITY BOARD
Engineering Draughtsmen

APPLICATIONS are invited for positions as ENGINEERING DRAUGHTSMEN for electrical plant layout in the Draw-Office of the Chief Engineer's Department in central London.

Applicants should preferably have served an engineering apprenticeship and have had technical training. Experience in the layout of transforming plant, H.V. switchgear and cables would be an advantage.

The posts are graded under Schedule "D" of the National Joint Board agreement as Grade 6—£458/£595. 7s. per annum, inclusive of London Allowance, and the commencing salaries will be dependent upon qualifications and experience.

Application forms obtainable from Personnel Officer, 46/7 New Broad St, E.C.2, to be returned completed by 27 Feb., 1954. Please enclose addressed foolscap envelope and quote ref. V/1580/T on envelope and all correspondence. (G 592)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER required in the Planning and Operation Section at No. 1 Sub-Area Headquarters, 24 Hatton Garden, Liverpool 3. Salary £766/£794 p.a. (N.J.B. Class L, Grade 10).

Applicants must have the technical qualifications necessary to enable them to become Chartered Electrical Engineers. They should be experienced in all aspects of the distribution of electricity and possess knowledge of the technical and economic principles underlying the design of distributing systems.

The appointment is superannuable and subject to medical examination.

Application forms, obtainable from the Manager, above address, should be returned to him in an envelope endorsed "Third Assistant Engineer" not later than 22 Feb. 1954. (G 568)

SOUTH WALES ELECTRICITY BOARD

REQUIRED Commercial Assistant, District 221 (Port Talbot) in the West Central Sub-Area.

Applicants must have had experience in the application of electricity to domestic and commercial premises and all general purposes.

Salary—Class G, Grade 10 (£608/£619/£630) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience, and three referees, to be addressed to the Secretary to arrive by 20 Feb., 1954.

D. G. DODDS,
Secretary.
St. Mellons,
Cardiff. (G 601)

STATE ELECTRICITY COMMISSION OF VICTORIA (AUSTRALIA)

APPLICATIONS are invited for the following senior posts:

1. ASSISTANT ENGINEER FOR PRODUCTION: Salary range £A2,268 per annum to £A2,468 per annum.

The appointee to this post will be the deputy to the Engineer for Production who is responsible for the administration and co-ordination of the Production Department, comprising four Branches associated with Coal Production, Generation, Electrical Operations and Briquette Production.

Applicants should possess an engineering degree of a recognised University or hold other acceptable engineering qualifications, and should have had extensive experience in the operation of a large electrical supply system. A knowledge of the production, handling and utilisation of various types of fuel, including black and brown coals, briquettes and oil, would be an advantage.

Applicants should possess the necessary personality, technical knowledge and experience to successfully control and direct technical staff and the operation and maintenance of a large electricity supply system which includes brown coal winning and briquette manufacture.

2. ASSISTANT ENGINEER FOR GENERATION: Salary range £A1,918 per annum to £A2,118 per annum.

The appointee to this post will be the deputy to the Engineer for Generation, who is responsible for the operation and maintenance of the Commission's thermal power stations consisting of nine steam and three diesel stations of total capacity of 600,000 kW with a further 250,000 kW of steam plant to come into operation within the next few years.

Applicants should possess an engineering degree of a recognised University or hold other acceptable engineering qualifications, have held a responsible position associated with a large inter-connected generating system and have the necessary ability and experience to control and direct the work of technical staff engaged on the operation and maintenance of power stations.

The Commission has a capital investment of £A150,000,000 and an annual revenue of £A21,000,000, and serves over 600,000 consumers—the supply network covering the greater part of the State of Victoria.

The installed capacity of the generating system exceeds 650,000 kW on 50 cycle and 25 cycle operation. The annual output is more than 3,300 million kWh generated in steam, hydro, and diesel power stations. The main transmission is 132,000 V, with 220,000 V transmission under construction. A large expansion programme is designed to nearly double the present installed capacity within the next five years.

The present annual output of coal from the Commission's open cuts is approximately 7,500,000 tons, necessitating the removal of about 3,500,000 cubic yards of overburden. The production of briquettes is about 550,000 tons per annum.

Applications, giving full details relating to education, qualifications and experience, stating date of birth and accompanied by copies of testimonials, should be submitted in order to reach the Secretary at the address below, not later than 31 Mar., 1954. State Electricity Commission of Victoria, 22-32 William St, Melbourne C.1, Victoria Australia. (G 560)

BRITISH ELECTRICITY AUTHORITY
North Western Division

VACANCY No. 21/54— MAINTENANCE ENGINEER (Mech.), Agecroft H.P. Generating Station, near Manchester. Salary £787/£818 (G.6).

Vacancy No. 22/54—ASSISTANT MAINTENANCE ENGINEER (Mech.), Stuart St Generating Station, Manchester. Salary £717/£748 (H.8). Previous applicants under vacancy No. 205/53 need not re-apply.

Applications, quoting vacancy No. to Establishments Officer, British Electricity House, 825 Wilmslow Rd, Manchester 20, before 20 Feb. (G 574)

TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

APPOINTMENT OF SENIOR ASSISTANT ACCOUNTANT

APPLICATIONS are invited from Chartered, Incorporated or Certified Accountants with some experience in the Accounting and Stores branches of a modern industrial concern, preferably in an Electricity Supply Undertaking, to fill the post of Senior Assistant Accountant with the Trinidad and Tobago Electricity Commission. Preference will be given to applicants who are also Members of the Institute of Costs and Works Accountants.

The commencing salary is £1,045 a year, rising by £27. 10s. to £1,127. 10s. When the total sales of electricity exceed 100 million units the salary range will be £1,155 to £1,237. 10s. A cost of Living Allowance of £25 per year and a House Allowance—maximum £10. 8s. 4d. if married and £6. 5s. if single—per month are also payable. An Outfit Allowance of £60 will be granted on arrival.

The successful applicant will be required to undergo a medical examination. He will be provided with first class passages for himself, his wife and two children up to the age of 18, on appointment. Leave passages to the United Kingdom or equivalent will be provided every three years. Vacation, casual and sick leave on full pay.

General details of Trinidad's climate, income tax, etc., can be obtained from the West India Committee at 40 Norfolk St, London, W.C.2.

Applications giving full details of qualifications, experience, and personal particulars, together with two recent references, should reach the General Manager, Trinidad and Tobago Electricity Commission, P.O. Box 121, Port-of-Spain, Trinidad, B.W.I., on or before 28 Feb., 1954. (G 523)

COUNTY BOROUGH OF BLACKPOOL

APPOINTMENT OF TECHNICAL ASSISTANT

APPLICATIONS are invited for the superannuable appointment, in the Electrical Services Department, of a Technical Assistant graded on Scale APT.11—(£495 x £15 to £540). (The National Joint Council have recommended an increase of £25 from 1 Apr., 1954.) The post is subject to special conditions as to office hours, particulars of which may be had on application.

The Candidate must be experienced in draughtsmanship and have knowledge of electricity distribution and lighting techniques.

Applications, giving particulars of age, present position, qualifications and experience, including names and addresses of two referees, to be forwarded to the Illuminations and Public Street Lighting Officer, Electrical Services Department, Rigby Rd East, Blackpool, to reach him not later than 27 Feb., 1954.

Canvassing of, or the submission of the names of, members of Council as referees will disqualify candidates.

TREVOR T. JONES,
Town Clerk.
(G 565)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

APPLICATIONS invited for the post of TECHNICAL ENGINEER, Aberdeen Area. Salary commencing at a point within the range of £791/£850 (N.J.B. Grade F/5 or F/4) depending on qualifications and experience. Superannuation Scheme applicable.

Applicants should have had recent experience of: Carrier Protection and Communication equipment, and of one, at least, of the following:

(1) Relays and Protection equipment.
(2) Meters and Instruments.

The Aberdeen Area of the Board comprises Urban and Rural territory, and circuit voltages of 132 kV, 33 kV, 11 kV and 6·6 kV (and lower) are employed.

Application form, obtainable from Area Manager, Millburn St, Aberdeen, should be returned by 1 Mar., 1954.

J. E. WHITTAKER,
Area Manager.
Millburn St,
Aberdeen (G 595)

BRITISH ELECTRICITY AUTHORITY
Southern Division

APPLICATIONS are invited for the position of:

SECOND ASSISTANT ENGINEER (DEVELOPMENT)
GENERATION CONSTRUCTION DEPARTMENT

The duties of the post will include the continued survey of the Division for practicable sites for generating stations, and the consideration of the future of existing stations together with site and plant investigation problems. This will involve a comprehensive knowledge of such subjects as hydraulics and thermodynamics and some acquaintance with geophysical data.

The applicant should preferably have had manufacturing works experience, and some operational experience in power stations. Recent experience should include work on the layout of large modern power stations.

Applicants should be corporate members of one of the senior engineering Institutions, or hold equivalent qualifications.

Salary: N.J.B. AX/CX, Grade 2, £834/£1,025.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, should be returned by 24 Feb., 1954. (G 598)

BRITISH ELECTRICITY AUTHORITY
Midlands Division

APPLICATIONS are invited for the following positions in the Generation (Operation) Department. N.J.B. service conditions, superannuable appointments, salaries within Schedule "A" of the Agreement:

(*a*) ASSISTANT SHIFT CHARGE ENGINEER at Ocker Hill Power Station, Grade F9, commencing at £607 per annum (Vacancy No. 604MD).

(*b*) ASSISTANT ENGINEER at Nechells "B" Power Station, Grade J12, commencing at £596 per annum (Vacancy No. 605MD).

Applicants for these positions should have received a sound technical training and power station practical experience, in particular for (*a*) in the operation and maintenance of steam generating plant and main switchgear. Appropriate technical qualifications an advantage.

Apply on form AE6, quoting the vacancy number, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 27 Feb., 1954. (G 594)

BRITISH ELECTRICITY AUTHORITY
Midlands Division

THIRD ASSISTANT ENGINEER (mechanical) is required in the Generation Construction Department at Hams Hall "C" Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule C, Grade 5, commencing in range £649/£790, ultimately rising to £858 per annum.

A sound technical education with practical training, and previous constructional experience in the erection of boilers, turbines, and ancillary mechanical plant are required. Appropriate technical qualifications will be an advantage.

Apply on form AE6, quoting Vacancy No. 603 MD, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 27 Feb., 1954. (G 593)

SOUTHERN ELECTRICITY BOARD
Branch Installation Assistant

SWINDON District (Faringdon) of No. 2 (Newbury) Sub-Area. Salary N.J.B. Class E, Grade 11, Column 1 (£524 per annum). N.J.B. Conditions of Service.

Applicants should have sound experience in preparation of specifications and estimates for all types of electrical wiring installations, particularly industrial work. Candidates should be competent to supervise electricians and organise allocation of work.

The successful candidate will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, and returned to him in envelopes suitably endorsed not later than 22 Feb., 1954. (G 600)

YORKSHIRE ELECTRICITY BOARD
No. 1 (Bradford) Sub-Area

SECOND ASSISTANT ENGINEER
(Estimating, Installation and Appliance Maintenance)

THE successful applicant will be responsible for the organisation of the Sub-Area Installation and Appliance Maintenance Sections. Applicants should have a wide experience in the Electricity Supply Industry in connection with the supervision of schemes for all classes of domestic, commercial and industrial installations, including specifications, estimates and tenders, together with a sound practical experience in the organisation and administration of large workshops dealing with repairs to all types of domestic, commercial and industrial equipment.

Salary—N.J.B. Class K, Grade 7, £869/£907 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford, not later than 25 Feb., 1954.

No. 7 (Grimsby) Sub-Area

WORKSHOP SUPERINTENDENT
(Appliance Maintenance)

Applicants should have had a sound technical education and extensive experience in the supervision of workshops, handling the complete renovation of electrical domestic appliances, including the keeping of records and statistics in connection therewith. The successful applicant will also be required to supervise the servicing of apparatus on consumers' premises.

Salary—N.J.B. Class G. Grade 10, £608/£630 per annum.

NOTE: It is anticipated that on 1 Apr., 1954, the Sub-Area will be reclassified and the salary scale will then be £641/£667.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Rd, Grimsby, not later than 25 Feb., 1954. (G 575)

SOUTH EAST SCOTLAND ELECTRICITY BOARD
Lothians Sub-Area

THIRD ASSISTANT ENGINEER required in the Planning and Technical Section at Sub-Area Headquarters, Musselburgh.

The duties include the planning and estimating of schemes, both underground and overhead, in an area consisting of urban and rural networks at voltages up to and including 33 kV. Technical education to the Higher National Certificate standard and practical experience in the construction of overhead lines and substations is desirable. N.J.B. Class G, Grade 10, £608—£630 per annum. Superannuation Scheme.

Applications by letter, stating age, education, qualifications and experience, with details of present appointment and salary should be submitted to the Sub-Area Manager, South-East Scotland Electricity Board, High St, Musselburgh, within fourteen days. (G 566)

BRITISH ELECTRICITY AUTHORITY
Southern Division

A VACANCY exists in the Drawing Office of the Construction Department at Portsmouth for a:

SENIOR ENGINEERING DRAUGHTSMAN (MECHANICAL)

Candidates should have a good technical education in Mechanical Engineering and experience in one or more of the following:

1. Design and layout of power station plant including turbo-alternators, boiler plant, and general station auxiliaries.
2. H.P. and L.P. steam and feed pipework, condensing plant and feed heating systems.
3. Conveyor plant, coal and ash handling systems.

Salary N.J.B. Schedule D, Grade 5, £567/£671.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, should be returned by 24 Feb., 1954. (G 599)

BRITISH ELECTRICITY AUTHORITY
South Western Division

STATION SHIFT CONTROL ENGINEER required at Bath Generating Station.

Superannuation Scheme. Salary, N.J.B., Class "D," Grade 10, £531/£547.

Candidates should possess good technical qualifications, and have had training and experience in the control and operation of steam generating plant and main switchgear.

Applications on Form AE6/ACT, obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 22 Feb., 1954. (G 596)

BRITISH ELECTRICITY AUTHORITY
East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

ENGINEERING DRAUGHTSMAN (CIVIL)
CONSTRUCTION DEPARTMENT
Vacancy No. 1/54

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction drainage and sanitation schemes, associated with official and administrative buildings.

The salary will be in accordance with Grade 5 (£567/£671 per annum) or Grade 6 (£433/£567 per annum) of Schedule D of the National Joint Board Agreement.

ENGINEERING DRAUGHTSMEN
(MECHANICAL)
CONSTRUCTION DEPARTMENT
Vacancy No. 2/54

Senior Draughtsmen are required in the Mechanical Section of the Construction Department at North Wilford Power Station. Candidates should have experience in one or more of the following:

(i) Design and layout of Power Station equipment, including turbo-alternators, boiler plant, coal and ash plant, and general station auxiliaries.
(ii) H.P. and L.P. steam and feed pipework. Condensing plant and feed heating systems.
(iii) Conveyor plant, coal handling systems and material handling of station auxiliary equipment.

The salary will be in accordance with the National Joint Board Agreement, Grade 5 (£567/£671 per annum) and Grade 6 (£433/£567 per annum) of Schedule D according to experience.

ENGINEERING DRAUGHTSMEN
(ELECTRICAL)
CONSTRUCTION DEPARTMENT
Vacancy No. 3/54

Candidates should have experience in the preparation of layouts and diagrams for the installation of E.H.T. and L.T. switchgear, transformers, E.H.T. and L.T. cables; knowledge of protective gear systems would be an advantage.

The salary will be in accordance with the National Joint Board Agreement, Grade 5 (£567/£671 per annum) and Grade 6 (£433/£567 per annum) of Schedule D according to experience.

CONTROL ENGINEER
AVON POWER STATION
Vacancy No. 12/54

Candidates should have had a good technical training and be experienced in Control Room operation.

The salary will be in accordance with the National Joint Board Agreement, Class E, Grade 10 (£555/£569 per annum).

The closing date for this appointment is 18 Feb., 1954.

SECOND ASSISTANT ENGINEER (CIVIL)
DIVISIONAL HEADQUARTERS
Vacancy No. 14/54

Preference will be given to applicants who have a degree in Civil Engineering, are Corporate Members of the Institution of Civil Engineers or possess equivalent qualifications.

They should have had experience in the design and construction of heavy foundations, river works, structures in reinforced concrete and steel and other civil engineering works associated with the design and construction of Power Stations.

Experience in the preparation of specifications, bills of quantities and estimates will be a recommendation.

Salary will be within Class AX/DX, Grade 2 (£834/£1,053 per annum) of the

Continued in next column

Continued from previous column

National Joint Board Agreement.

Closing date for this appointment will be 18 Feb., 1954.

SHIFT CHARGE ENGINEER
FREEMAN'S MEADOW POWER STATION,
LEICESTER
Vacancy No. 15/54

Applicants should have had previous experience in the operation of a large pulverised fuel fired Station and be technically qualified.

Salary will be within Class H, Grade 7 (£772/£802 per annum) of the National Joint Board Agreement.

Closing date for this appointment will be 25 Feb., 1954

STATION CHEMIST
DRAKELOW POWER STATION
Vacancy No. 16/54

Candidates must have experience in the analysis of coal, oil and water. Power Station experience in a responsible position is essential, preferably with high pressure and high temperature operation, the associated problems and their solution.

Experience in control of staff is desirable.

Salary will be within Class J, Grade 7 (£817/£852 per annum) of the National Joint Board Agreement.

Closing date for this appointment will be 5 Mar., 1954.

ASSISTANT MECHANICAL MAINTENANCE ENGINEER
LEICESTER POWER STATION
Vacancy No. 17/54

Preference will be given to applicants holding the Higher National Certificate or equivalent in Mechanical Engineering, and who have had experience in maintenance work in a large generating station. P.F. equipment maintenance experience an advantage.

Salary for the appointment will be within Class H, Grade 8 (£717/£748 per annum) of the National Joint Board Agreement.

Closing date for this appointment will be 25 Feb., 1954

ASSISTANT ENGINEER (INSTRUMENTS)
FREEMAN'S MEADOW POWER STATION,
LEICESTER
Vacancy No. 18/54

Applicants should have the Higher National Certificate or equivalent together with sound practical experience in the maintenance of instruments in a large P.F. fired generating Station.

Salary for the appointment will be within Class H, Grade 11 (£607/£628 per annum) of the National Joint Board Agreement.

Closing date for this appointment will be 25 Feb., 1954

The above positions will be pensionable within the provisions of the B.E.A. and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.
(G 604)

NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

Wear Sub-Area

SECOND ASSISTANT ENGINEER at Sub-Area Headquarters, Dunning St, Sunderland. Applicants should be qualified engineers and must have had extensive experience in all classes of electrical engineering construction work. Salary, Class L, Grade 7, £926/£966. N.J.B. conditions of service.

Harrogate Sub-Area

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER at Harrogate District. Applicants should have experience in all aspects of service to domestic, commercial and smaller industrial consumers. Salary, Class E, Grade 10, £555/£569. N.J.B. conditions of service.

Applications stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North-Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne, within ten days of the appearance of this advertisement. (G 591)

BRITISH ELECTRICITY AUTHORITY
London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or C. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for (*a*) and Corporate Membership for posts (*b*) an advantage.

(b) DEPUTY STATION SUPERINTENDENT—
BATTERSEA GENERATING STATION

Candidates should have had experience, in a responsible position, of the operation and maintenance of large, modern H.P. Power Station plant. Successful applicant will be responsible to the Station Superintendent for all aspects of work in the Station, and must possess proven ability in modern methods of personnel management. Salary—Class M, Grade 3=£1,393 p.a.

Accommodation will be available to the successful candidate.

(b) DEPUTY STATION SUPERINTENDENT—
WATTS GROVE AND GLAUCUS ST
GENERATING STATIONS

Experience in administrative duties, programming of maintenance work and efficient operation of plant. Salary—Class E, Grade 3=£900. 18s. p.a.

Applicants who applied for previous vacancy need not re-apply.

(b) OPERATION & EFFICIENCY ENGINEER—
WOOLWICH GENERATING STATION

Applicants should have had a comprehensive experience of modern Power Station operation. Salary—Class G, Grade 5=£872. 11s. p.a.

Applicants who applied for previous vacancy need not re-apply.

(a) JUNIOR ENGINEERS—
(1) BLACKWALL POINT GENERATING STATION
(2) WEST HAM GENERATING STATION
(3) STEPNEY GENERATING STATION

(1)—General Duties in Generating Station.
(2)—Control Room Shift Duties (Assistance).
(3)—Good technical training with Generating Station experience desirable. General duties in Generating Station operation. Applicants will have opportunity to gain experience on P.F. boilers.

Salaries:
(1)—Class F, Grade 14=£491 p.a.
(2)—Class H, Grade 14=£541. 16s. p.a.
(3)—Class F, Grade 14=£491 p.a.

Applicants who applied for previous vacancy for (3) need not re-apply.

2ND ASSISTANT ENGINEER (CIVIL)—
DIVISIONAL HEADQUARTERS,
WESTMINSTER, S.W.1.

Applicants should be qualified Civil or Structural Engineers with considerable experience in the design and construction of major power station works, or similar projects, including design of steel and reinforced concrete Structures, Foundations, River Works and Tunnelling. A knowledge of Soil Mechanics would be an advantage. Salary—Class AX/EX, Grade 2= £875. 14s. to £1,133 p.a.

JUNIOR ENGINEERS—CHEMISTRY DEPARTMENT

Applicants required for general duties in Division. In the first instance they will be required to serve for a period on work in connection with non-destructive methods of testing metals associated with boilers, steam pipes, etc., and will ultimately proceed to a more general type of training in Power Station Operation or Maintenance. Salary—Class AX, Grade 9=£415 to £551. 5s. p.a.

Application may be made on form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Great Portland St, W.1, and be received within 14 days of this advertisement. (G 572)

SOUTH WESTERN ELECTRICITY BOARD

DEMONSTRATOR required in Falmouth. Salary N.J.C., Grade I (£380—£470). Candidates should possess recognised domestic science qualification. Application Forms obtainable from District Manager, 6 Grove Place, Falmouth, to be returned completed by 20 Feb. (G 552)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

MIDLANDS ELECTRICITY BOARD
WALSALL DISTRICT

Second Assistant District Engineer

APPLICATIONS are invited for the appointment of Second Assistant District Engineer in the Walsall District of the Wolverhampton Sub-Area.

The salary and conditions for the post will be in accordance with the N.J.B. Revised Schedule, Class F, Grade 7, at present £697 per annum.

Applicants should have technical qualifications equivalent to those required for Corporate Membership of the Institution of Electrical Engineers and have experience in the construction, maintenance and operation of industrial and Urban High and Low voltage networks. Experience of convertor and rectifier equipment and traction system will be an advantage. The successful candidate will be expected to undertake standby duties.

Applications for the above post, stating age, qualifications and experience, present post and salary should reach F. J. Elliott, Esq., M.I.E.E., Sub-Area Manager, 83 Darlington St, Wolverhampton, within fourteen days of the appearance of this notice.

A. STEPHENS,
Secretary.
(G 588)

BRITISH ELECTRICITY AUTHORITY
South Wales Division

APPLICATIONS invited for superannuable N.J.B. appointment of CHIEF DRAUGHTSMAN to take charge of Divisional Drawing Office, with civil, mechanical and electrical sections, including transmission, together with the Registry, Printing and Tracing personnel.

Applicants should have knowledge of large drawing office management methods and wide experience in some aspect of power station construction. Salary Schedule D, Grade 1, £961/£1,114 per annum.

Application forms obtainable from Divisional Secretary, South Wales Division, British Electricity Authority. Twyn-y-fedwen Rd, Gabalfa, Cardiff, should be returned by 26 Feb., 1954. (G 597)

APPLICATIONS are invited by THE ENGLISH ELECTRIC CO., LTD., for engineers having wide experience in the preparation of comprehensive and specialised schemes of machine control. Applicants must be of Higher National Certificate standard and capable of preparing schemes in detail. Apply quoting ref. 1244 to Dept. C.P.S., 336/7 Strand, W.C.2. (G 564)

ASSISTANT INSULATION ENGINEERS: Young men possessing a Degree or Higher National Certificate in Electrical Engineering and who are interested in Insulation Work, are invited to apply for a position as ASSISTANT ENGINEER in the Technical Department of a large switchgear manufacturing company on the North-East Coast. The work includes, experimental and theoretical investigations into dielectric phenomena, stress control, corona, insulation co-ordination and new insulating materials and techniques. Experience of similar work desirable, but not essential. Starting salary according to age, qualifications and experience. Apply stating full particulars to Box 3211, Electrical Times. (G 433)

CABLE JOINTERS required immediately for Aden Refinery Project. Applicants must be competent in joining main cables and have at least 5 years' experience as Jointer with well-known cable manufacturers. Good pay, free messing and accommodation, contract approximately 9 months.

Apply, giving full details of all previous experience, to GEORGE WIMPEY & CO., LTD., Personnel Division (19), 1 Queen Caroline St, Hammersmith, W.6. (G 553)

COUNTER ASSISTANT for Wholesalers, London, W.14 district, used to Electrical Trade. Apply with full particulars in confidence, stating age, experience and wages required to—Box 3275, Electrical Times. (G 608)

A VACANCY has occured for the position of Senior Electrical and Mechanical Engineer, with first-class qualifications, on the Staff of a well-known Electrical Contracting firm in London. Experience of Contracting as opposed to Manufacturing essential. Write stating education, qualifications, age, experience and salary required to Box 3257, Electrical Times. (G 562)

BROOKHIRST SWITCHGEAR LTD., of Chester, invites applications from qualified engineers for the position of SALES DEVELOPMENT ENGINEER specialising in the electric control of Machine Tools. Applicants should have had extensive commercial and technical experience in the application of electric drive and control in relation to the Machine Tool Industry. This is a senior appointment involving responsibility for sales development and promotion within this specialised field in both the Home and Overseas Market. Apply giving particulars of education, training, experience, age and salary required, to Group Personnel Officer, Metal Industries Ltd., Victoria Station House, London, S.W.1. (G 614)

CONTRACTS ENGINEER required to handle tenders and contacts for switchgear up to and including 33 kV equipment, and thoroughly experienced in associated protective and control schemes. Knowledge of export procedure would be an advantage. Applications giving full details of past experience and salary required to be addressed to THE PERSONNEL MANAGER, South Wales Switchgear Ltd., Blackwood, Mon. (G 554)

ELECTRICIAN required for installation work on electrical equipment associated with Furnaces and ancillary equipment in Steelworks and Glassworks. Good salary, pension scheme, interesting job calling for liaison with customers electrical staff. Must be prepared to travel and should have had experience of A.C. and D.C. motors and control schemes from F.H.P. to 200 h.p. Apply by letter with details of age, experience, etc., endorsing envelope "Electrician," Stein and Atkinson Ltd., Parnell House, 25 Wilton Rd, London, S.W.1. (G 583)

ELECTRICAL DESIGNERS and DRAUGHTSMEN required permanently. Experience in Lighting and Power Installations for Schools, Hospitals and other large institutions. Five-day week. Excellent prospects. Interview expenses refunded. Confidential Applications to E. G. Phillips, Son and Norfolk, Consulting Engineers, Arskus House, Annesley Grove, Nottingham. (G 609)

ELECTRICAL DESIGN ENGINEER capable of initiating and supervising a programme of development of flameproof switchgear and allied control and distribution equipment is required by THE ENGLISH ELECTRIC CO., LTD., at Liverpool. Good qualifications and experience of designing to meet B.S. 229 are essential. Please write giving, in confidence, full details to Dept. C.P.S. 336/7 Strand, W.C.2, quoting ref. 777B. (G 607)

ELECTRICAL DRAUGHTSMEN with good experience in cable, power and lighting installation layouts for heavy industrial works. Salaries in accordance with experience and ability. Staff Profit Sharing Scheme and Pension Fund after twelve months' service. Canteen facilities available. Apply, stating age and full particulars of experience in chronological order to: The Chief Engineer, The Associated Portland Cement Manufacturers Ltd., Portland House, Tothill St, Westminster, London, S.W.1. (G 576)

ELECTRICAL ENGINEER required for Electrical Department of Works in the North-East. Should have a sound practical training, drawing office experience, a knowledge of motor control gear resistance calculations, and preferably some experience of electrical heating for industrial applications. Apply giving full details of experience, technical qualifications, age, whether married or single and salary required, to—Box 3265, Electrical Times. (G 580)

ELECTRICAL ENGINEER required in London for preparation of drawings and specifications for electrical installations in department stores, etc. Salary up to £650 per annum. Write stating age, qualifications and experience, to Box ET 931, LPE, 110 St. Martin's Lane, W.C.2. (G 551)

ESTIMATOR is required in Central London for inside work on electric motor sales. Experience of this work essential. Permanent and pensionable position. Write quoting ref. ABDG to—Box 3263, Electrical Times. (G 578)

EXPERIENCED Switchgear Salesmen required to handle range of LV Switch and Distribution Gear in London area. Connections with Consultants, Contractors and Government Departments essential. Old-established company. Superannuation scheme. Reply giving full details and salary required to Box 3259, Electrical Times (G573)

FALK STADELMANN AND CO., LTD. Have vacancy for experienced assistant in their domestic appliances department at their head office, 91 Farringdon Rd, London, E.C.1. Administrative experience in stock control and correspondence required. Preference given to candidates with knowledge of buying and selling. Applications in writing only addressed to "A" Dept. (G 586)

FERGUSON RADIO CORPORATION LTD. offers exceptional opportunities to DRAUGHTSMEN wishing to make their career in the world of electronics, television and radio. Candidates preferably experienced in the Radio and Television industries, must have knowledge of mass production methods and workshop practice. Familiarity with Ministry requirements an advantage. Good salaries; Pension Scheme. Well equipped Drawing Offices and good working conditions. Apply: Employment Manager, Ferguson Radio Corporation Ltd., Great Cambridge Rd, Enfield, Middx. (G 570)

FUSEGEAR TECHNICAL REPRESENTATIVES. Immediate openings are available with THE ENGLISH ELECTRIC CO., LTD. Applicants must have a Higher National Certificate (Electrical) and practical engineering experience or training. Please write, giving full details and quoting ref. 1073B to Dept. C.P.S., 336/7 Strand, W.C.2. (G 455)

GENERAL ASSISTANT ENGINEERS, Class E, Grade II, £524/540 per annum, N.J.B. scales and conditions. One to reside in or near Kirkcaldy and one Cupar, Fife. Higher National Certificate or equivalent qualifications and experience. H.V. and L.V. Rural Distribution. Applications stating age, qualifications and experience, to South East Scotland Electricity Board, East Port, Dunfermline, within 10 days. (G 558)

INDUSTRIAL MOTOR SALES ENGINEER is required in the London area by THE ENGLISH ELECTRIC CO., LTD. Applicants must have experience of this type of work. Write giving full details in confidence, quoting ref. 477E to Dept. C.P.S. 336/7 Strand, W.C.2. (G 579)

LEADING STEAM TURBINE MANUFACTURER requires several experienced SENIOR SALES ENGINEERS to handle estimates and tenders for home and export inquiries. Applications, stating age, experience and qualifications to—Box 3273, Electrical Times, quoting ref. DJD. (G 606)

MAINS Cable Sales Dept. has vacancy for ASSISTANT/ESTIMATOR. Previous experience desirable. Apply in confidence. The Edison Swan Electric Co., Ltd., Cable Dept., 155 Charing Cross Rd, London, W.C.2. (G 610)

OLD established London Electrical Contracting firm requires fully qualified assistant. Applicants would be required to take part share in business and be prepared at a later date to accept full control on partial retirement of proprietor. A wonderful opportunity for a young man holding a degree and some money to invest. Please write fully to—Box No. 3251, Electrical Times. (G 557)

JUNIOR ELECTRICAL ENGINEER required for Design and Development, F.H.P. motors for aircraft fuel system accessories. Main qualifications Higher National Certificate Electrical Engineering. Practical experience of winding and diagnosis of motors desirable but not essential. Write, stating age, training and salary required, to Self-Priming Pump and Engineering Co., Ltd., Trading Estate, Slough, Bucks. (G 561)

OVERHEAD Line Site Engineers, ASSISTANTS, and SURVEYORS required by Contractor for Wood Pole Construction Work in Scotland. Reply giving full particulars of experience and qualifications, which will be treated in confidence. —Box No. 3261, Electrical Times. (G 577)

REPRESENTATIVES for London and Northern England required by firm in Electrical Industry.—Box No. 3271, Electrical Times. (G 602)

SALES DIRECTOR. A prominent Group of Companies manufacturing electrical equipment wishes to appoint a Sales Director. This position calls for considerable experience in sales promotion and administration in relation to both Home and Overseas territories. In addition to the direction and supervision of the activities of the independent Sales Organisations of the Companies in the Group, he will be required to explore and develop new markets, particularly overseas. Applicants, who must be qualified electrical engineers, must have held a similar senior appointment in the electrical industry. The commencing salary will be not less than £2,500 per annum. Applications, which will be treated in strict confidence and which should state present salary, should be forwarded to Box 2J C.4830, A.K. Advg., 212a Shaftesbury Ave, London, W.C.2. (G 590)

SALES REPRESENTATIVE required resident in the East Midlands Electricity Board Area to call upon Service Centres and Wholesalers. Good salary and prospects for man age 25/35, of good education and appearance. Submit full personal details to Burco Ltd., Rosegrove, Burnley. (G 589)

SURVEYOR required, conversant with Surveying and Profiling Overhead Line Routes. Good wages and subsistence paid. Inverness, Elgin Area. Apply: B. French Ltd., Pike Mills, Green St, Kidderminster. (G 547)

THE ENGLISH ELECTRIC CO., LTD., Stafford, has interesting vacancies for ENGINEERS to assist in the preparation of comprehensive tenders and contracts for hydro-electric schemes. Applications are invited from those having experience of this type of work and also from young engineering graduates or H.N.C. holders who have a background of practical engineering experience, preferably with a commercial bias. Please apply to Dept. C.P.S., 336/7 Strand, W.C.2, quoting Ref. 756B. (G 569)

THE National Boiler and General Insurance Co., Ltd., St. Mary's Parsonage, Manchester 3, require ENGINEERS for appointment as Inspecting Engineers of (*a*) Boilers and Engines, (*b*) Lifts and Cranes, and (*c*) Electrical Plant. First-class M.o.T. Certificate of Competency, and/or Higher National Certificate (Mechanical or Electrical), full apprenticeship and practical experience necessary. Apply in own handwriting giving age (limits 26 to 33), training and experience, academic qualifications and copies of testimonials. Salary £540/£785 (progressive). Non-contributory pension scheme. (G 611)

YOUNG ELECTRICAL ENGINEER required to assist with preparation and supervision of all light and heavy electrical work associated with furnaces and auxiliary equipment for steel and glass works. Basic knowledge of A.C. and D.C. motors and control schemes. Prepared to travel. Progressive and interesting job. Pension scheme. Apply, stating salary required, details of age, experience, etc., and endorsing envelope "Assistant Electrical Engineer," Stein and Atkinson Ltd., Parnell House, 25 Wilton Rd, London, S.W.1. (G 582)

THE Associated Ethyl Company Limited, Northwich, Cheshire, has vacancies in the drawing office of their Engineering Department for ELECTRICAL DESIGNER DRAUGHTSMEN. Applicants should be between 25 and 30 years of age, have served an engineering apprenticeship and preferably obtained a Higher National Certificate or currently studying for same. Preference will be given to applicants who are experienced in the design and layout of electrical distribution and utilisation work as practised in either chemical or petroleum processes.

Consideration will be given to applicants between 21 and 25 years of age who have served an engineering apprenticeship, preferably in the heavy chemical or petroleum industry, for the position of trainee draughtsmen.

Technical education should be equivalent to the standard required for the Higher National Certificate, but applicants holding the Ordinary National Certificate will be considered.

Successful candidates, will for a period of two to three months be based at Northwich, after which they will be transferred to the Company's new establishment at Ellesmere Port.

Starting salary will be offered commensurate with age, qualifications and experience. Applications should be addressed to the Personnel Manager at the above address. (G 536)

TRANSFORMER DRAUGHTSMAN, age 30/40 years, required to take charge of Drawing Office. Experience in Transformers to 4,000 kVA 33 kV essential. Must be able to control staff and a good organiser. Pension scheme available. Apply giving details, education, experience, salary to Lindley Thompson Transformer Co., St. Mary's Rd, Slough. (G 500)

APPOINTMENTS WANTED

ADVERTISER, 30 years Electrical Industry. At present Asst. Comm. Officer Electricity Authority in charge contracting section—needs change. Maintenance factory, institution, etc. Full charge. Box No. 3231, Electrical Times. (G 479)

A.M.I.E.E., ex assistant Naval Attache Moscow, speaks perfect Russian. Has been doing executive work for years, exp. in selling. At present a director of company, not electrical—seeks an opening.—Box No. 3279, Electrical Times. (G 613)

PARIS, ENGLISH, ELEC. ENGINEER seeks full or part-time post, advertising, agency, or liaison.—Box No. 3243, Electrical Times. (G 548)

WANTED

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock water-tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox water-tube boilers for dismantling.—Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath, Staffs. (G 2)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26, Britannia Walk, London, N.1. (G 4)

WANTED, for prompt cash, ferrous and non-ferrous SCRAP: also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady St, Bethnal Green, E.1. (G 1)

WANTED. ROTARY CONVERTERS, any size.—Universal, 221 City Rd, London. E.C.1. (G 6)

WANTED Secondhand Motor Generator or Rectifier, 3 Phase 400 V. to 110 V. D.C., 10/15 KW. Must give constant voltage under changing loads. Write Box 3249. (G 556)

WORK WANTED

ABOUT guaranteed rewinds to the trade. Armatures, Fields, Stators and Transformers, fractional to 25 h.p. 24 hour postal service on vac and drill windings. Cleaners rebuilt, sprayed and recovered as new. Guaranteed results. Give us a trial and send sample machine, if dissatisfied no charge made. All spares carried in stock. Every machine subjected to 1,000 volt flash test before leaving our modern factory. Repetition work at special rates, all quotations free. Neptric Ltd., 73/79 Hurst St, Birmingham 5. Midland 4041/2/3. Branches in most provincial towns. (G 432)

A.C. and D.C. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (G 13)

ARMATURE REWINDING service to the trade. Vacuums, Drills, Grinders, Hood Dryers, Dental Motors. Vacuum cleaner and drill armatures replaced from stock 24-hour service. Every job guaranteed. All vacuum cleaner parts, hoses, etc., in stock for any make. Apex washer agitator shafts stocked.—Regam Electric Cleaner Service, 95, Park Lane, Leeds, 1. (G 20)

METALWORK. All types cabinets, chassis, racks, etc., to your own specification.—Philpott's Metalworks Ltd., Chapman St, Loughborough. (G 38)

WORK WANTED. Capacity available for all types of COIL WINDING.—Box No. 2425, Electrical Times. (G 17)

FOR SALE

A.A. ELECTRICAL CO. for A.C.-D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chi 5105, 67 Rothschild Rd, W.4. (G 7)

A.C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works Ltd., Milo Rd, East Dulwich, S.E.22 (Forest Hill 2278-9). (G 3)

A.C.-D.C. QUARTERLY and SLOT METERS.—Brent Electrical Co., 6 Holmdale Gardens, London, N.W.4. (G 5)

A.C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 5566-9. (G 9)

A HIGH VACUUM IMPREGNATION UNIT or single or batch coil impregnation service to R.I.C. Specification 214 or individual requirements. — Blickvac, 505 Lordship Lane, S.E.22. Tel.: Forest Hill 7089. (G 18)

ALTERNATORS 230 V. 2·75 kVA. 50 cycles 1 Phase with exciter. Five only. 40 h.p. 400 V. 3 Ph. 50 cycles slip-ring motor with oil immersed starter. Above items may be seen running. Offers for all or part. N. J. Froment, Electrical Workshops, Stamford, Lincs. 'Phone 3388. (G 571)

CARBON LAMPS. Ediswan, Osram, 240 V, 16 C.P., doz. 36s.; 220 V, 50 C.P. 200 W, 42s.; also 110 V ditto. Suplex Lamps Ltd., 239 High Holborn, London, W.C.1. (G 539)

DON'T worry about your electricity bills. Fit 1s. slot electric meters for hotels, bed-sitters, etc. Prices from 50s.—Selectrics, Department E.T., Castle Circus House, Torquay. Tel. 7218. Trade inquiries invited. Trade discount. (G 21)

GUARANTEED NEW, boxed, not ex Government, Crompton Parkinson ¼ h.p. MOTORS. 200 to 250 v., 50 cycle, £4 each, carriage extra. 338 Central Drive, Blackpool. Phone 24748. (G 501)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Rd, London, E.C.1. (G10)

INDEX TO ADVERTISERS

Aerialite Ltd. 27
Alton Battery Co., Ltd. 59
Aluminium Wire & Cable Co., Ltd. ... 9
Aron Electricity Meter Ltd. 24
Arrow Electric Switches Ltd. 3
Asea Electric Ltd. 25
Ashdowns Ltd. 26
Association of Steel Conduit Manufacturers 15
Attwater & Sons Ltd. 56

Babcock & Wilcox Ltd.... ... Cover (i)
B.B. Chemical Co., Ltd.... 62
Brayhead Springs Ltd. 58
British Electric Resistance Co., Ltd. ... 60
British Insulated Callender's Cables Co., Ltd. 37
British Thomson-Houston Co., Ltd. Cover (iv)
Brush Electrical Engineering Co., Ltd.... 18
Burco Ltd. 30

Castle Engineering Co. (Nottingham) Ltd. 54
Castell Locks Ltd. 66
Channel Conduits Ltd. 52
Connollys (Blackley) Ltd. 11
Cox Walkers Ltd. 56
Cressall Manufacturing Co., Ltd. ... 5

Dynamo & Motor Repairs Ltd. ... 8

East London Mica Works 12
Edison Swan Electric Co., Ltd.... ... 38
Electrical Times Ltd. 50
Electro Mechanical Manfg. Co., Ltd. ... 58
Electro Methods Ltd. 64
English Electric Co., Ltd. ... 7, 53

Ferranti Ltd. 35
Fibreglass Ltd. 65
Fisher, H. (Oldham), Ltd. 62
Follsain-Wycliffe Foundries Ltd. ... 66
Foster Transformers Ltd. 4
Fry's Metal Foundries Ltd. 28

General Cable Manufacturing Co., Ltd. 67
General Electric Co., Ltd. ... 40, 55
G.M. Engineering (Ottery St. Mary) Ltd. 33
Grelco Ltd. 66
Griffiths, Gilbart, Lloyd Co., Ltd. ... 50

Harboro' Rubber Co., Ltd. 50
Heatrae Ltd. 6
Henley's, W. T., Telegraph Works Co., Ltd. 41
Heyes & Co., Ltd. 21
Higgs Motors Ltd. 10

Igranic Electric Co., Ltd. 34
Inductive Appliances Ltd. 58

Johnson & Phillips Ltd. ... 39, 51

Kelly, John, & Son 64

Legg (Industries) Ltd. 2
Loheat Ltd. 64
London Electric Wire Co., & Smiths Ltd. 32

Martindale Electric Co., Ltd. 49
Metropolitan-Vickers Electrical Co., Ltd. 36
Morley's Electrical Services Ltd. ... 2
M. & P. Fluorescent Fittings 52

Nalder Bros. & Thompson Ltd. ... 16
New Switchgear Construction Co., Ltd. 26

Parmiter, Hope & Sugden Ltd. Cover (iii)
Partridge Jones & John Paton Ltd. ... 14
Partridge, Wilson & Co., Ltd. 23
Plasticable Ltd. 50

Rawlplug Co., Ltd. 60
Resistances Ltd. 64
Reyrolle, A., & Co., Ltd. 20
Rheostatic Co., Ltd. 17
Rowlands Electrical Accessories Ltd. ... 19

Sangamo Weston Ltd. 42
Saxonia Electrical Wire Co., Ltd. ... 62
Shell Mex & B.P. Ltd. 61
Sigmund Pumps Ltd. 29
Smart & Brown (Engineers) Ltd. ... 12
South Wales Switchgear Ltd. 49
Spencer Wire Co., Ltd. 30
Standard Telephones & Cables Ltd. ... 63
Steatite & Porcelain Products Ltd. ... 31
Stewarts & Lloyds Ltd. 1
Sturdy Electric Co., Ltd. 62
Sunvic Controls Ltd. ... ... Cover (ii)

Thorpe, F. W., Ltd. 22
T.M.C.-Harwell (Sales) Ltd. 57
Tok Electrical & Industrial Mechanisms Ltd. 54

Universal Boilers & Engineering Co., Ltd. 13

Volex Electrical Products Ltd.... ... 68

Washers Ltd. 66
Wootton & Co., Ltd. 22

Yorkshire Switchgear & Engineering Co., Ltd. 18

FLAMEPROOF MOTORS, M.G. SETS, D.C. MOTORS, GEARED MOTORS, A.C. MOTORS, TRANSFORMERS, CONTROL GEAR. SPECIALS. FLANGE MOTORS

ELECTROPOWER COMPANY LIMITED

Kingsbury Works, Kingsbury Rd, London, N.W.9
Tel.: COLindale 4621/3,
Grams: Lektropowa, Hyde, London (G12p)

GENERATORS 540 kW 130/175 V, D.C. GENERATOR by Bruce Peebles. 4125/3075 amps. Shunt interpole, open type frames, split carcase. Suitable for direct coupling. Speed 428 r.p.m.

500 kW, 480/520/550 V, D.C. GENERATOR by Bruce Peebles, 1040/910 amps compound interpole, 3-wire, fitted 4 slip-ring. Speed 750 r.p.m.

250 kW GENERATOR by Met-Vick., for 500/440 V D.C., 2-wire, 500 amps. Speed 375 r.p.m. Open type, compound wound.

200 kW GENERATOR by E.C.C., for 200 V D.C., speed 1,000 r.p.m. Open type, single pedestal bearing. Compound wound, fitted interpoles.

200 kW GENERATOR by Mavour and Coulson, for 500 V D.C., 400 amps. Speed 380 r.p.m. Open type, 6 pole, compound interpolar wound. Single pedestal R.O.B. George Cohen, Sons and Co., Ltd., Wood Lane, London, W.12. Tel.: Shepherds Bush 2070 and Stanningley, nr. Leeds, Tel.: Pudsey 2241. (G 612)

"LUCY" kiosk, Oil Cooled "Foster" TRANSFORMER, 100 kVA. 2 phase. Primary 11,000 V. 2·59 amps. Secondary 400 V. 144 amps. Tappings plus or minus 2½% to 5%. H.T. connections Delta. L.T. connections Star.—Box 3253. (G 559)

NEW and unused Barlow and Whitney ELECTRIC OVENS, 415 V., 3 Ph, 4 wire, 40 kW, max. temp. 250°C, complete with recording, process timing and control cabinets, inside measurements 8 ft 6 in. d., 7 ft 3 in. w., 6 ft 5 in. h., offered at less than half cost price. Woodfield and Turner, Bankfield Mill, Burnley. Tel. 3065. (G 502)

TIME SWITCHES for sale. Reconditioned or new. 12 months' guarantee. Immediate delivery. Lists from: J. W. Hughes, 3 St. Thomas' St, London Bridge, S.E.1. (Tel.: HOP 2759.) (G 474)

TINNED STEEL ARMATURE BINDING WIRE. All sizes from 14 s.w.g. to 30 s.w.g. supplied in coil or on reels.—Frederick Smith and Co., Wire Manufacturers Ltd., Caledonia Works, Halifax. (G 40)

MERCURY SWITCHES are made by Hall, Drysdale and Co., Ltd., of 58 Commerce Rd, Wood Green, London, N.22. Tel.: BOW. 7221. (G 11)

PURLEY CHOKES AND BALLASTS. Our 80-W tapped h.p.f. ballast with starter switchgear-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. W. Blanshard Ltd. (Dept. E.T.), Purley, Surrey. Uplands 4818-9. (G 14)

AGENCIES

COMPANY Agents holding a sound connection with the Engineering and Electrical industry throughout the South Western Counties and South Wales, require agency with a reputable manufacturer of electrical switchgear.—Box No. 3267, Electrical Times. (G 581)

M.A.A.—THE BADGE OF A GOOD MANUFACTURERS' AGENT. Manufacturers requiring reputable Agents are invited to communicate with the Secretary, The Manufacturers' Agents Association of Great Britain and Ireland (Inc.), Rosebery House, 8 Breams Buildings, London E.C.4. Membership available to established agents only. Particulars supplied. (G 39)

MANUFACTURERS of Mining and Industrial Switch and Control Gear require representation in South Wales. Only applicants with established connections in this field considered. I.C.A. Newspaper House, Ayr, Scotland. (G 555)

PAKISTAN. Well connected Electrical Firm, Karachi, Lahore and Chittagong, seek agencies mains cables and overhead conductors.—Box 3255, Electrical Times. (G 563)

MISCELLANEOUS

IT is desired to secure the full commercial development in the United Kingdom of British Patents Nos. 630,197-630,448 and 630,486, which relate to "ELECTRIC CONTROL AND INDICATING DEVICES" either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specifications should apply to Stevens, Langner, Parry and Rollinson, 5 to 9 Quality Court, Chancery Lane, London, W.C.2. (G 587)

E.A.W. CERTIFICATE FOR ELECTRICAL SALES ASSISTANTS

THE next EXAMINATION (Theoretical) FOR THE E.A.W. CERTIFICATE FOR ELECTRICAL SALES ASSISTANTS will be held on Tuesday, 18 May, 1954, from 2 p.m. to 5 p.m. at various centres in Great Britain.

Full particulars and entrance forms may be obtained from: Examinations Department, The Electrical Association for Women, 35 Grosvenor Place, London, S.W.1.

IMPORTANT: The final date of entry for the Examination is 6 Apr., 1954. (G 584)

CITY AND GUILDS (Electrical, etc.) on "No Pass—No Fee" terms. Over 95 per cent. successes.—For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook FREE and post free.—B.I.E.T. (Dept. 39), 29 Wright's Lane, London, W.8. (G 15)

FREE! Brochure giving details of courses in Electrical Engineering and Electronics, covering A.M.Brit.I.R.E., City and Guilds, etc. Train with the Postal Training College operated by an Industrial Organisation. Moderate fees. E.M.I. Institutes, Postal Division, Dept. ET29, 43 Grove Park Rd, London, W.4. (G 278)

BUSINESS OPPORTUNITIES

REQUIRED to purchase, or acquire controlling interest in, small Electric Motor or similar manufacturing business, range up to 10 h.p., or a company having suitable facilities for same.—Box No. 3269, Electrical Times. (G 585)

Manufacturers with world-wide Distributing Organisation and Reputation require Manufacturing and/or Marketing Rights for additional Lines.

Products mainly of interest to the Hardware, Building, Electrical and Engineering Trades preferred.

Replies, which will be treated as strictly confidential, should be addressed in the first instance to:

RUMBLE, CROWTHER & NICHOLAS, LTD. 184, Strand, London, W.C.2

(G 383p)

Maintenance more important than ever before

Make regular use of...

MARTINDALE COMMSTONES (Regd.)

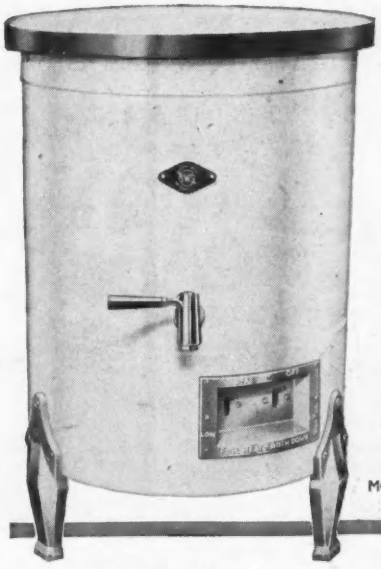
● Cut copper, brass and steel without clogging. Edges of every bar left clean; no dragging of copper. Save 75% of time and cost of turning commutator in lathe. Give longer life to motors, etc.

Over 50 sizes in stock, in 2 grades : coarse and fine. 20 different types of handle.
Over 25,000 regular users all over the world.
We also manufacture a range of Mica Undercutting Tools, both power and hand types, as well as Tool Holders for Commutator turning and grinding. Send for details.

MARTINDALE ELECTRIC CO., LTD.
45 WESTMORLAND ROAD, LONDON, N.W.9
also at 25 ELMBANK STREET, GLASGOW, C.2

S.W.S

ELECTRIC WASHBOILERS



MODEL 352.J.

EFFICIENT

RELIABLE

ROBUST

★ A competitive series in every way.

★ The hand agitator unit is a special extra on all SWS models.

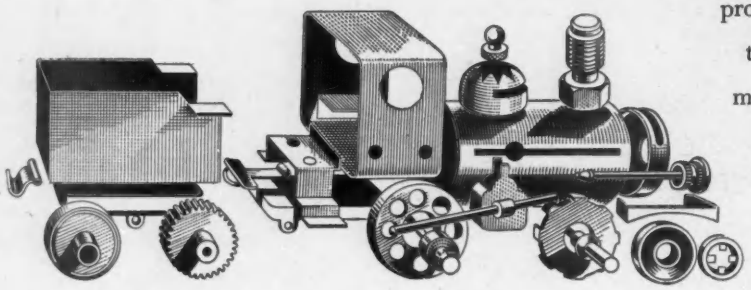
★ Available in cream or white.

Write for full details today to :-

SOUTH WALES SWITCHGEAR LIMITED BLACKWOOD - MONMOUTHSHIRE

DS

HIGH SPEED AUTOMATICS



Modern machinery and mass production methods give you top quality capstan and automatic work and sheet pressings at a price you are sure to like—and on time

GRIFFITHS, GILBART, LLOYD & CO. LTD.

EMPIRE WORKS · PARK ROAD · BIRMINGHAM, 18

Tel.: NORthern 6221

G·G·L

P.V.C. Sleevings, Insulated Wire & Flex

Plasticable Ltd

(A.I.D. Approved)

Hawley Lane, Farnborough, Hants

Telephone: Farnborough, Hants 85

Instruction Chart

For dealing with apparent death from

ELECTRIC SHOCK

Mounted on metal or strong board, varnished and corded for hanging

Price: metal 5/- or strong board 3/-, plus 1/- postage (per single copy)

ELECTRICAL TIMES

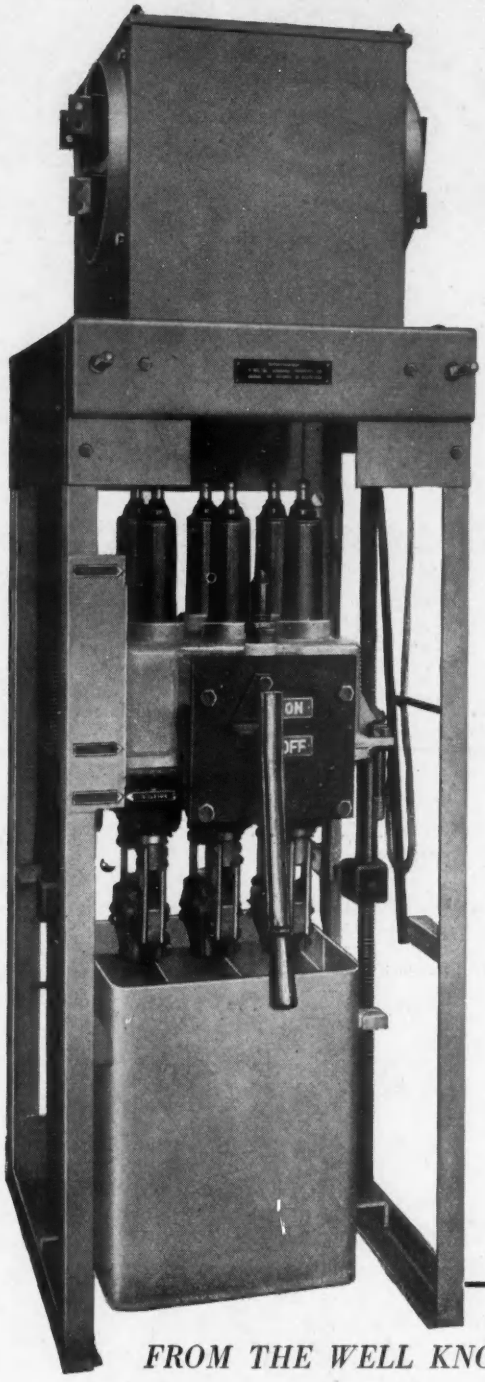
SARDINIA HOUSE

SARDINIA STREET - LONDON - W.C.2

Ask *Dainite* about MOULDED RUBBERS

THE HARBORO' RUBBER CO., LTD.
MARKET HARBOROUGH Tel: 2274/5

AN OIL-SWITCH YOU CAN



ISOLATE

without interrupting supply in ring main units

DESIGNED...

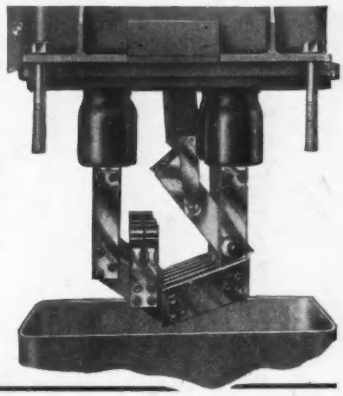
. . . to enable complete isolation of the switch for ease of inspection and maintenance (with no interruption of supply in ring main units)

. . . to make and carry fault currents up to 250 MVA at 6.6 kV (also tested to B.S. 116/1937)

. . . so that electro-magnetic forces assist the closure of the switch under through-fault or short-circuit conditions (it cannot possibly be forced open)

. . . for mounting on a simple framework (yet having a full complement of interlocks)

. . . for maximum voltage of 11 kV and maximum current rating of 600 amperes (it has liberal clearances yet small dimensions)



★ Internal view of a unit showing contact arrangement

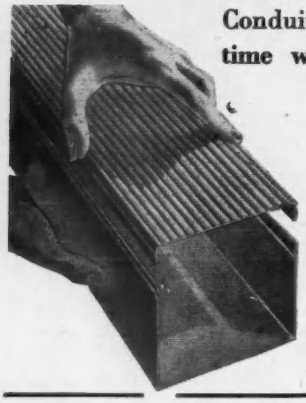
FROM THE WELL KNOWN **TRINAL RANGE**
OF INTERCHANGEABLE SWITCHGEAR

JOHNSON & PHILLIPS LTD.
CHARLTON · LONDON · S.E.7
SPECIALISTS IN THE TRANSMISSION, TRANSFORMATION AND CONTROL OF ELECTRICITY

"I GIT THAR FUSTEST WITH THE MOSTEST MEN"

(*Nathan B. Forrest)

You will wonder, no doubt, what relationship this famous American Civil War General's* remark has to Channel Conduit. If the General had been a planning engineer, constantly at war with rising costs, he would undoubtedly have said that compared with other forms of cable trunking, Channel Conduit could be installed in the "fustest time with the leastest men."



If you do not already know why the minimum of labour is required to install Channel Conduit, please write for pamphlet R.A.12.

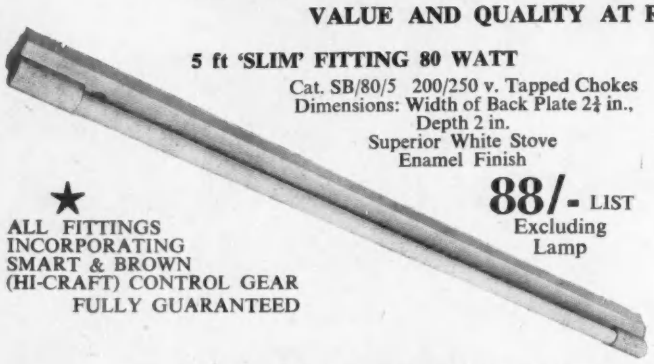
CHANNEL "Spring Capped" CONDUIT

Telephone : Abbey 2027/8

CHANNEL CONDUITS LTD., 11 VICTORIA STREET, LONDON, S.W.1

M & P FLUORESCENT FITTINGS

VALUE AND QUALITY AT REDUCED COSTS.



5 ft 'SLIM' FITTING 80 WATT
Cat. SB/80/5 200/250 v. Tapped Chokes
Dimensions: Width of Back Plate 2¼ in., Depth 2 in.
Superior White Stove Enamel Finish
88/- LIST Excluding Lamp

★ ALL FITTINGS INCORPORATING SMART & BROWN (HI-CRAFT) CONTROL GEAR FULLY GUARANTEED

4 ft 'SLIM' FITTING 40 WATT
Cat. SB/40/4 200/250 v. Tapped Chokes (as below)
Dimensions: Width of Back Plate 2¼ in., Depth 2 in.
Superior White Stove Enamel Finish
65/- LIST Excluding Lamp

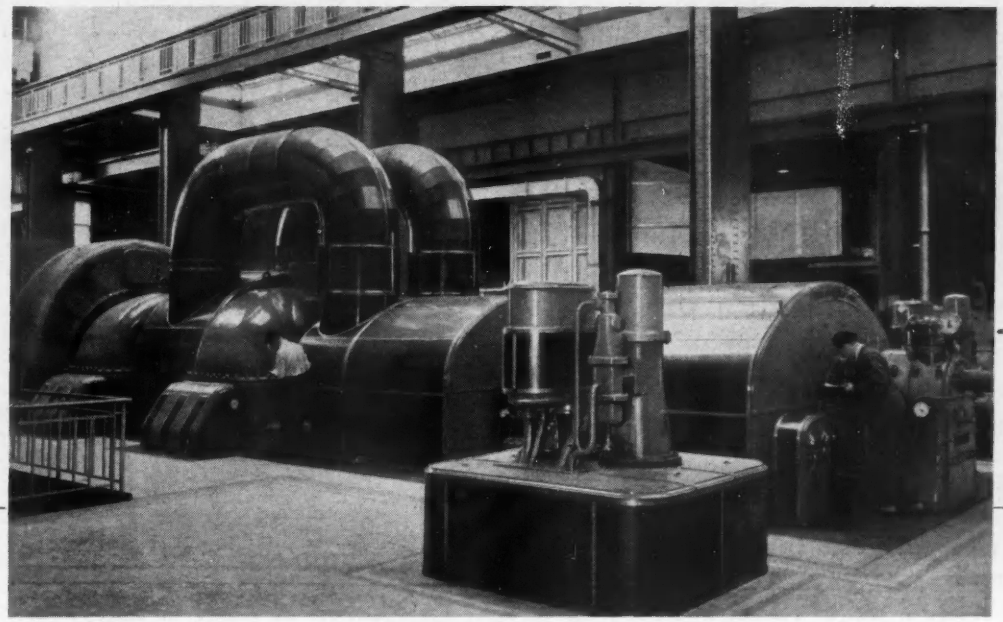
5 ft INDUSTRIAL OPEN TROUGH 80 WATT
Cat. ST/80/5 200/250 v. Tapped Chokes
Superior White Stove Enamel Finish
88/6 LIST Excluding Lamp

2 ft 'SLIM' FITTING 20 WATT
Cat. SB/20/2 (as above) 200/250 v. Tapped Chokes
63/- LIST

FULL TRADE TERMS
Enquiries for all types invited
Home and Export

M & P FLUORESCENT FITTINGS, 303 ESSEX RD, LONDON, N.1 Phone: CLISSOLD 5876 CANONBURY 4059

Turbo alternator set at Stourport 'B' Power Station



The 60-MW, 3000 r.p.m., 3-cylinder turbo-alternator set illustrated is installed in Stourport 'B' Power Station (British Electricity Authority, Midlands Division). The steam conditions are 1250 lb./sq. in., 950°F. exhausting to a 28.75 in. Hg. vacuum. The final feed temperature is 460°F., with five stages of heating. The main alternator is hydrogen cooled, has a rating of 55.5 MW and generates at 11.8 kV. A 4.5-MW 3.3-kV air-cooled house alternator is directly driven from the main alternator shaft. Excitation for both alternators is provided by a separate motor-driven exciter set. A second 60-MW set operating at 1500 lb/sq. in., 1050°F., will shortly be commissioned. (Consulting Engineers, Messrs. Ewbank & Partners.)

'ENGLISH ELECTRIC'

turbo-alternators

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Turbine Division, Rugby

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

STA3A

G

TOK takes the lead with this

PACKET TYPE SWITCH

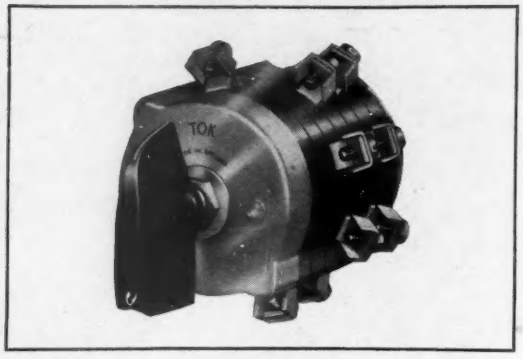
13/25 AMP rating for AC/DC and AC only

Here is a rotary switch that is very robust yet unusually compact. Clever design of the die cast top and indexing mechanism, with improved methods of fixing achieve considerable saving in height.

Contacts and terminals are of ample dimensions for the specified rating. Moulded packets are of high grade electrical quality bakelite. All other materials meet the most stringent electrical and mechanical requirements of the BSI.

Easy installation. Standard circuits are available including single, double and triple pole ON OFF selective switching and motor reversing; but switches are also made up to customers' own circuit requirements.

Ask for pamphlet No. 17.



Address your enquiries to :

TOK

TOK ELECTRICAL & INDUSTRIAL MECHANISMS LTD.

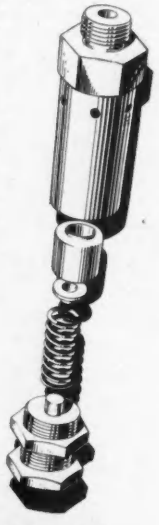
264-270 ST. JOHN STREET, CLERKENWELL, E.C.1. *Telephone : Clerkenwell* 2917

---

covering a multitude of jobs

A versatile fellow—the one-man band—and for real versatility you should see the extraordinary range of engineering components that come from "Castle" Works. They cover every conceivable field of industry. Repetition Work in All Metals, Precision Turned and Screwed, Machining and Light Assemblies.

Brochure on request.



The

CASTLE ENGINEERING

Company (Nottingham) Ltd

Haslam Street · Castle Boulevard · Nottingham

Telephone: Nottingham 46068 (3lines) Telegrams: "Capstan" Nottingham

for–

SUPERB

QUALITY–
EFFICIENCY–
RELIABILITY–
and STAMINA–

Ask by NAME

for

Osram

TUBES

FOR FLUORESCENT LIGHTING

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

ESTABLISHED 1868

ATTWATER & SONS LTD.

PRESTON, ENGLAND.

MICA AND MICANITE IN ALL FORMS.

VULCANIZED FIBRE. PEERLESS LEATHEROID.

PRESSPAHN AND FULLERBOARD In Sheets and Rolls.

EMPIRE CLOTH AND TAPES.

COTTON AND ALSO ASBESTOS DYNAMO TAPES.

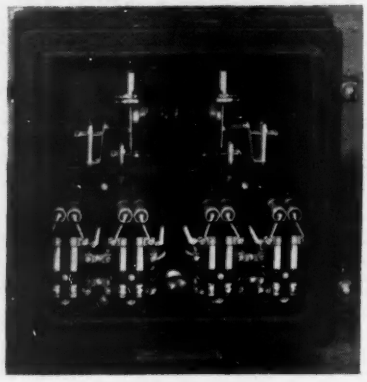
BAKELITE RESIN, VARNISH, SHEETS, TUBES, ETC.

For all oil-immersed Electrical Apparatus.

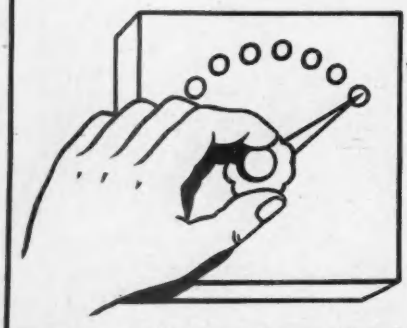
EBONITE AND ALL INSULATING MATERIALS FOR MANUFACTURING ELECTRICAL ENGINEERS.

COXOHM AUTOMATIC VOLTAGE *REGULATOR*

- Suitable for large A.C. or D.C. machines.
- Possesses extreme sensitivity.
- Accurate to within ± 1%.
- Full balancing gives stability under mobile conditions.
- Simple to install and to put into operation.
- Maintenance negligible.



As specialists in the field we shall be pleased to advise on the question of automatic voltage regulation if we may receive particulars of your specific requirements for any loading.



COX WALKERS LTD.

NORTH EASTERN ELECTRIC WORKS

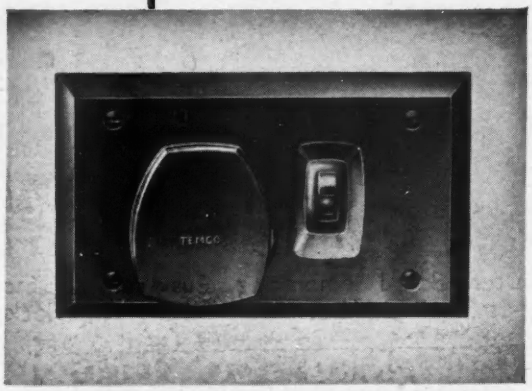
Established 1880 **DARLINGTON** *Phone 2387*

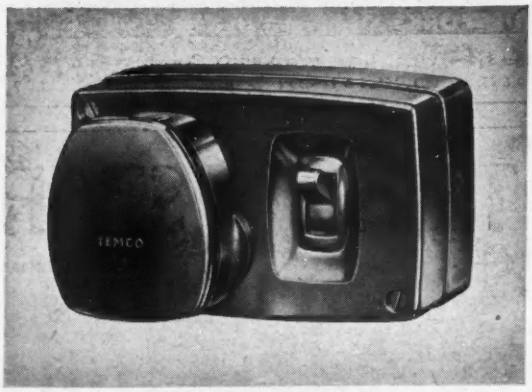
NEW

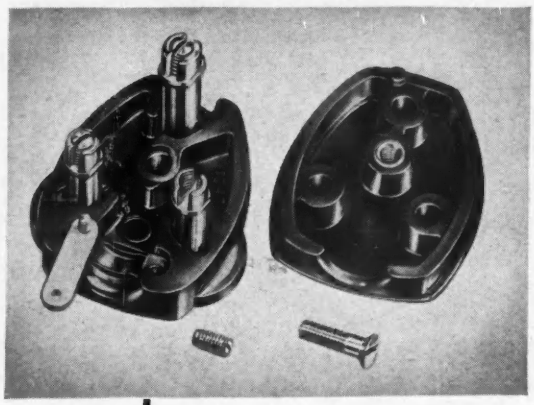
A. C. SWITCH SOCKETS & PLUGS

BY

TEMCO







SHORTLY AVAILABLE IN—

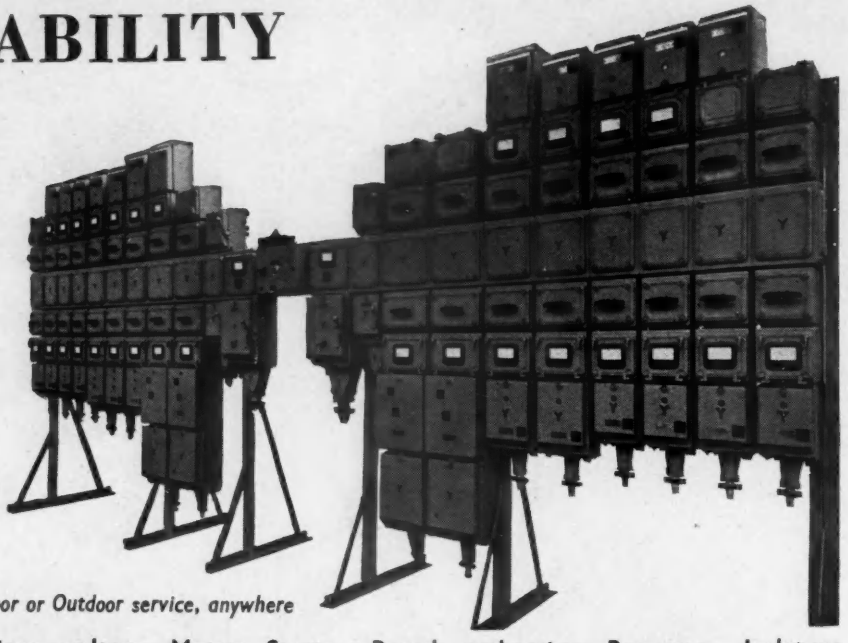
- ★ 5 and 15 amp. 3-pin to B.S.546
- ★ Surface and Flush
- ★ Single and Double Pole
- ★ Brown and Cream
- ★ Neat, attractive, individually packed
- ★ Designed for easy wiring
- ★ High quality at low price

If you have not received details of these new TEMCO Switch Sockets and Plugs, please write for the full descriptive leaflet.

T.M.C.—HARWELL (SALES) LIMITED
37 UPPER BERKELEY STREET, LONDON, W.1
Telephone: PADdington 1867/8/9

STAND No. 71
ELECTRICAL ENGINEERS EXHIBITION
Earl's Court, March 16-20

DEPENDABILITY



For Indoor or Outdoor service, anywhere

"Y" Unit-to-Unit, medium voltage Motor Starter Board embracing Bus run, Isolators, Back-up-Fuses. Contactor Starters and Stop-Start Push Buttons. Fully interlocked.

ELECTRO MECHANICAL MANFG. CO., LTD.

Tel: Scarborough 271516 SCARBOROUGH, YORKS Grams: EMMCO, SCARBOROUGH

London Office and Showroom: Grand Buildings, Trafalgar Square, W.C.2. Phone: Whitehall 3530

Associated with YORKSHIRE SWITCHGEAR AND ENG. CO. LTD., LEEDS & LONDON

R19

Take the IMP *out of* IMPACT

To protect valuable equipment with the new METPAK SHOCK ABSORBER is the complete insurance against damage in transit. Tested and proved and used extensively by the Ministry of Supply and many industrialists. Why not make sure *your* equipment is received in good condition. Write for full details.

Sole licensed manufacturers:

METPAK Regd.

BRAYHEAD SPRINGS LTD.

Full View Works, Kennell Ride, Ascot - - Berks.

Telephone: Winkfield Row 3115

TRAN ✸ STAR

REGD. TRADE MARK

FLUORESCENT LIGHTING

CONTROL UNITS

PIONEER OF ALL SELF-CONTAINED INSTANT-START BALLASTS

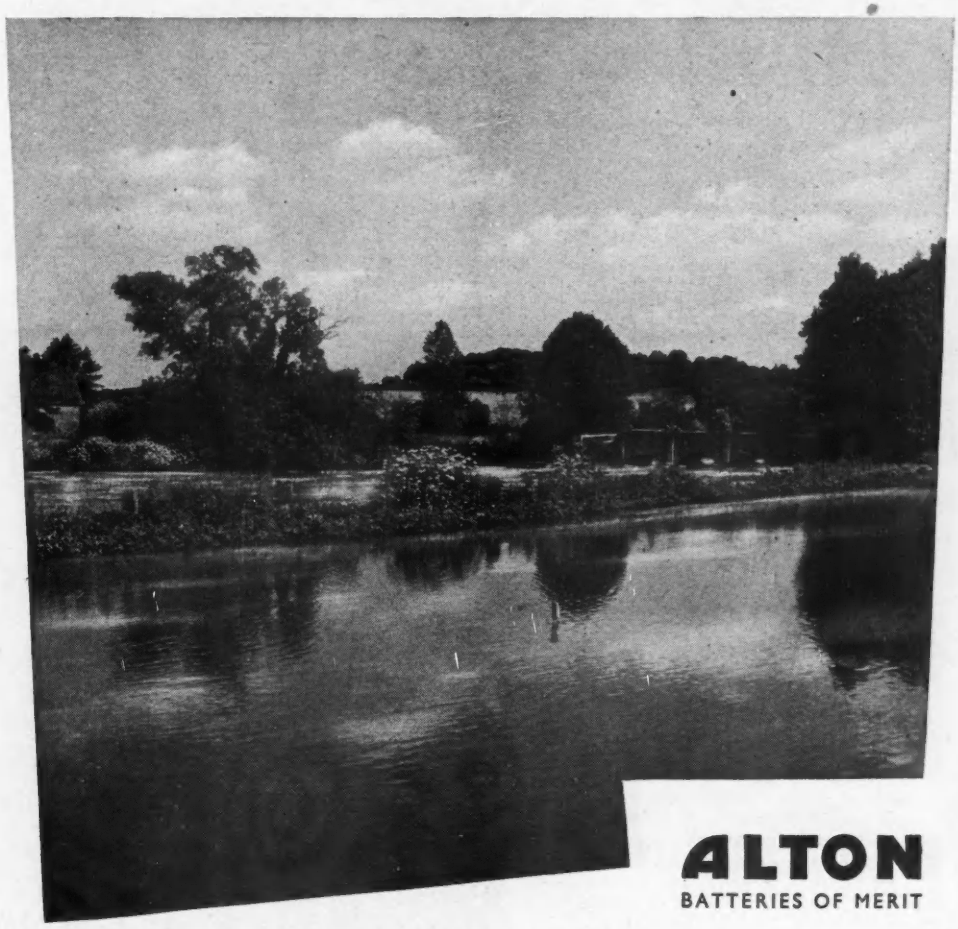
NOW FITTED WITH HIGH TEMPERATURE RESISTING CAPACITORS AND GUARANTEED FOR 3 YEARS

Sole Manufacturers:

INDUCTIVE APPLIANCES LTD.,

18 DEAN STREET, NEWCASTLE-UPON-TYNE, 1

From Alton go batteries to power stations all over the world. Batteries, as their distant users tell us, that possess a certain distinctive merit all their own. Surprising, in these days of uniformity and standardisation? But Alton, in such an age, is perhaps a surprising place. Alton's a small country town, with a friendly, satisfying life of its own. A natural place unchanged, unspoiled, where the surrounding streams run down through lovely and varied country to feed the river Itchen pictured below. Where a man at leisure can follow his bent, be it sport or hobby or just plain peace of mind. Where a life worth living, a job worth doing are any man's natural right : and pride in himself and the work of his hands is a wholly natural consequence.



ALTON
BATTERIES OF MERIT

Alton stationary batteries: 10 to 15,000 Ah. Also in regular production, renewal plates for all makes of battery, British and Continental

A23A

The Alton Battery Company Limited · Alton · Hants · *Telephone:* Alton 2267 and 2268 · *Telegrams:* Battery, Alton

All types of A.C. apparatus—motors, furnaces, rectifiers, transformers—can be controlled by a single Regavolt whose output can be set, regardless of the load current, precisely at any voltage from 0 to 30% above the supply. Its rugged design for heavy industrial duty ensures reliability under severe working conditions.

In addition to the wide range of single and 3 phase, hand and motor driven models which are obtainable from stock, special designs can be made for incorporation in your own apparatus. All models are listed in our catalogue No. 3121.

BERCO

REGAVOLT
REGULATING TRANSFORMER

THE BRITISH ELECTRIC RESISTANCE CO. LTD.
Specialists in the control of current and voltage for more than 25 years.
Queensway, Ponders End, Middlesex
Telephone: HOWard 1492 Telegrams: Vitrohm, Enfield

BR. 3121/AH

2000 hammer blows a minute from your electric drill!

Turn an ordinary electric drill into a sturdy hard-working power hammer, simply by slipping a Rawlplug Drill-Hammer into the chuck! This ingenious device converts rotary motion into percussion—one blow per rev. of the drill; with it you can bore concrete, etc. (up to ¾" holes) at really surprising speeds. Weight of blows adjustable to 'light', 'medium' or 'heavy'.

The Rawlplug Drill-Hammer is light and easy to use, yet has ample strength for long service and the severe treatment of practical conditions. An automatic clutch ensures that percussion takes place only when the tool is pressed against the masonry.

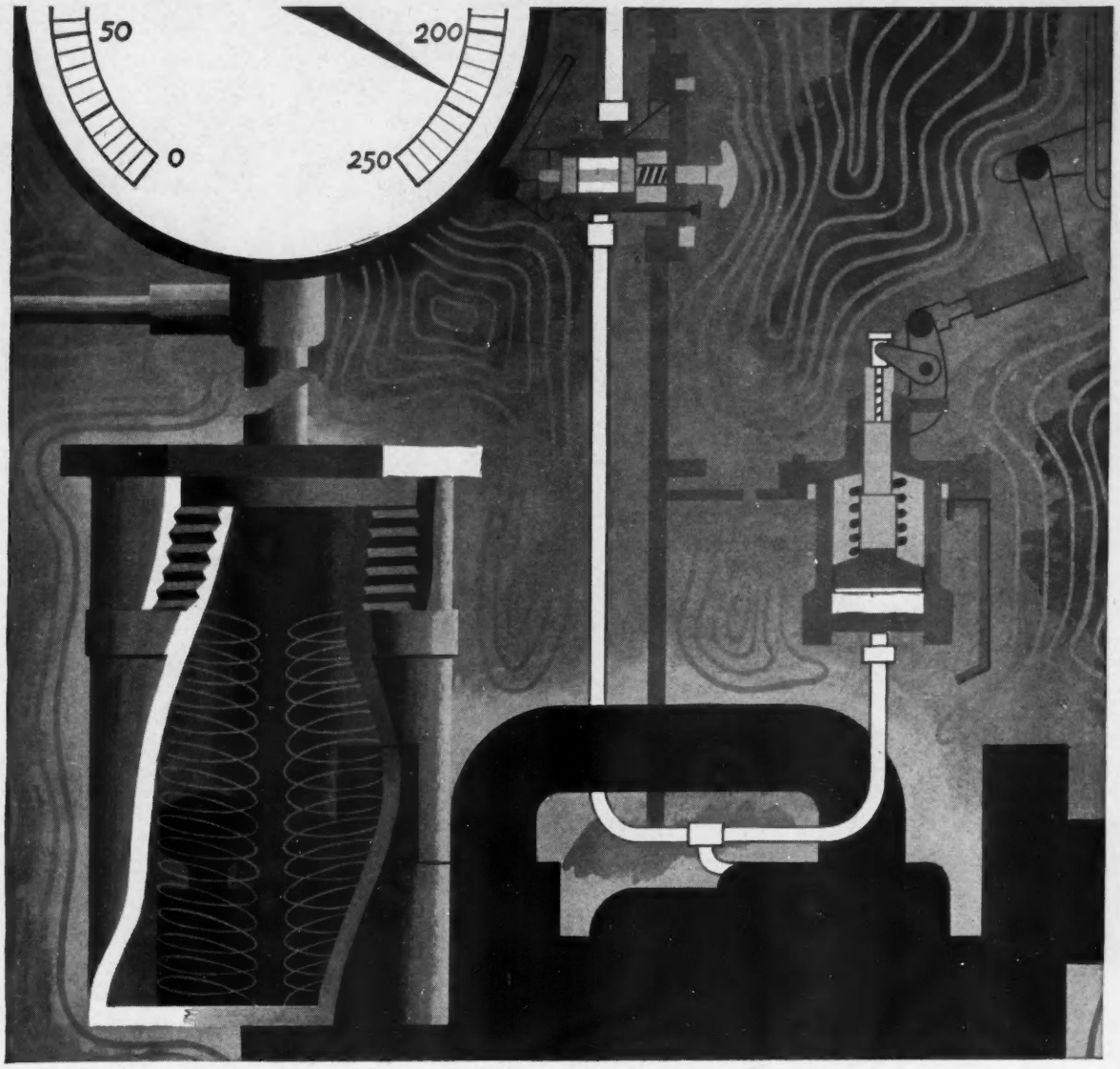
This tool will save you a lot of time and money—
Brief specification: *The best operating speed is between 1500-2000 r.p.m. and the Electric Drill should have a minimum ¼" chuck. Capacity: Rawlplug Hammer Drill No. 3H (⅛" diameter) to No. 20H (⅝" diameter). Weight 2¾ lb. Current consumption about 0.95 amps.*

8474

RAWLPLUG WALL PLUGS **DRILL HAMMER**

Write now for illustrated folder containing full technical details.

THE RAWLPLUG COMPANY LIMITED · LONDON · S.W.7



Inhibited for life

Where there's a turbine there must be oil—special oil circulating continuously through bearings and gears. If the turbine is to produce its full quota of electrical energy throughout its life, this oil must do a number of vital jobs.

It must lubricate of course. It must also cool, prevent corrosion, and act as the hydraulic medium in governors, overspeed trips and emergency gear. To do all these things without deterioration a turbine oil must have high resistance to oxidation and good demulsibility, and possess rust preventive properties of a high order.

Shell's answer to the problem is a range of specially selected and refined turbine oils—the Shell Turbo Oils. These contain inhibitors which counteract the effects of water and oxygen throughout the life of the turbine.

Acidity—another enemy—is countered, in many large turbine sets that are Shell-lubricated, by acidity tests at regular intervals. The readings are plotted on a graph kept by Shell as a continuous record of the oil's condition.

Shell inhibited turbine oils will function efficiently under the severest conditions for the longest possible period—the life of the initial charge is measured in decades. They will do this because they are the product of continuous and comprehensive research, closely geared to progress in turbine design. Even now, Shell experts are experimenting to produce better oils for the turbine of tomorrow.

Shell's laboratories at Thornton, Cheshire, cover an area of 800,000 sq. ft. and are manned by a staff of over 800—that's how Shell makes sure.

SHELL

LEADERSHIP IN LUBRICATION

Follow this man!

He is the 'Bostik' Man whose wide experience of adhesion and sealing in all industries will be of invaluable assistance to you. What he is anxious to do is to give you a realistic picture of how 'Bostik' Adhesives and Sealing Compounds can save you man-hours per job, cut production costs, step up production on efficiency. The 'Bostik' man is a specialist in solving tough problems of adhesion and sealing . . . and some have been very tough nuts indeed. It costs absolutely nothing to call in the 'Bostik' Man. Think what he might save you in production costs and headaches . . .

Bostik

ADHESIVES AND SEALING COMPOUNDS

Write to B. B. CHEMICAL CO. LTD., Ulverscroft Road, Leicester. 'BOSTIK' *is the registered trade mark of* B. B. CHEMICAL CO. LTD.

STURDY TRANSFORMERS

live up to their name

Sturdy Transformers are manufactured from 1 kVA to 100 kVA for all industrial applications and our technical service is always at your disposal.

Sturdy

ELECTRIC CO. LTD.

BURNOPFIELD (Telephone 237)

NEWCASTLE UPON TYNE

Dear Mr. Retailer,

Whenever you are in town you are cordially invited to see demonstrations of our new Autohome Appliances for Washing, Drying and Ironing, given daily at our West End Showroom,

LLOYD HOUSE, 44 BRYANSTON ST., LONDON, W.1. Tel: PAD 4078

H. FISHER (Oldham) LTD.

Full brochure gladly sent on request *BEST TRADE TERMS*

Works: OLDHAM · LANCS

SPECIALIST MANUFACTURERS OF
Highest Grade Rubber Covered

FLEXIBLE CABLES & CORDS

LIGHTING, POWER, DYNAMO LIFTS, WELDING and TRAILING CIRCULAR and OVAL FLEX ASBESTOS and FLAME RESISTING ENAMEL, SILK-COTTON and GLASS INSULATED WIRES, BARE COPPER BRAIDS, NON-RUBBER FLEXIBLES, PLAITED COPPER BRAIDS & CORDS

TRADE MARK

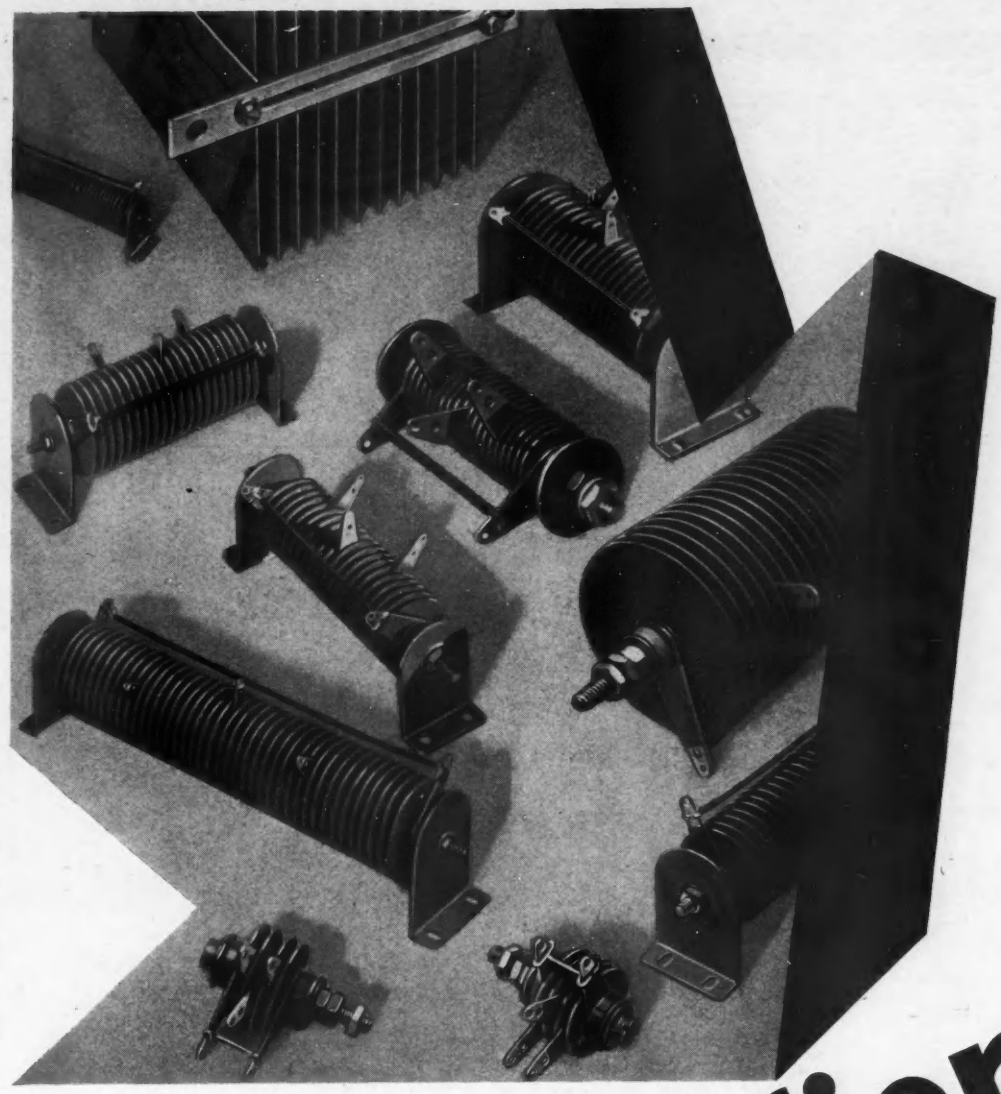
ESTABLISHED 1895

THE SAXONIA ELECTRICAL WIRE Co. Ltd.

Contractors to the Admiralty, War Office and Air Ministry

Offices and Works:

ROAN WORKS, GREENWICH, S.E.10



rectifiers for INDUSTRY

SELENIUM SenTerCel RECTIFIERS REGD TRADE MARK

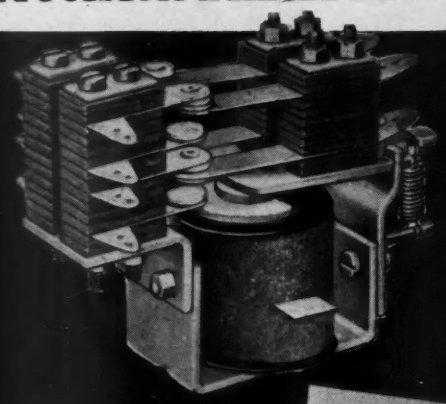
Please write for Bulletin F/SRT6

Standard Telephones and Cables Limited

Registered Office : Connaught House, Aldwych, London, W.C.2

RECTIFIER DIVISION : Warwick Road, Boreham Wood Hertfordshire *Telephone : Elstree 2401*

Precision RELAYS



- 1-, 2- or 4-pole AC/DC change-overs
- pneumatic time delays
- mechanical time delays
- for temperature control

AVAILABLE IN STANDARD RANGES OR MADE TO ORDER

TEMPERATURE & HUMIDITY CONTROLLERS

- CONTACT THERMOMETERS
  fixed or adjustable
  Range: -30° to +600°C
- CARTRIDGE THERMOSTATS
  Range: -100° to +600°F
  5 amp rating 250 volts AC

PROMPT DELIVERY

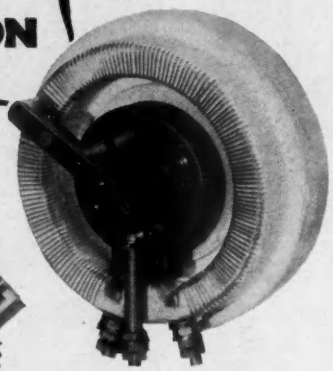
ELECTRO METHODS LTD
OF STEVENAGE

— THE FIRST NAME FOR
HIGH-STABILITY MAGNETIC AMPLIFIERS
and LOW-INERTIA INTEGRATING MOTORS

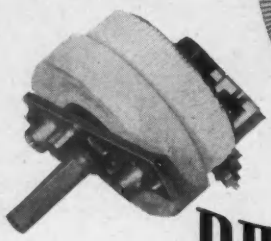
Full data from: ELECTRO METHODS LTD. Division RT23
CAXTON WAY, STEVENAGE, HERTS. Stevenage 780

DESIGNED
for use under conditions of
SHOCK
and
VIBRATION

Size R.T. 150 Type Embedded of 150 wts. rating



Size R.T. 50 Type
Embedded of 50 wts. rating



For these and other Types Write or phone

RESISTANCES Ltd

30, OXFORD ROAD, LONDON, N.4 *Arc 2155*

If you are wanting low-voltage transformers for portable tools, emergency lighting, or floor and soil warming,

please ask **LOHEAT** *to quote*

LOHEAT LTD., EDDINGTON WORKS, HUNGERFORD, BERKS.
Phone: HUNGERFORD 244

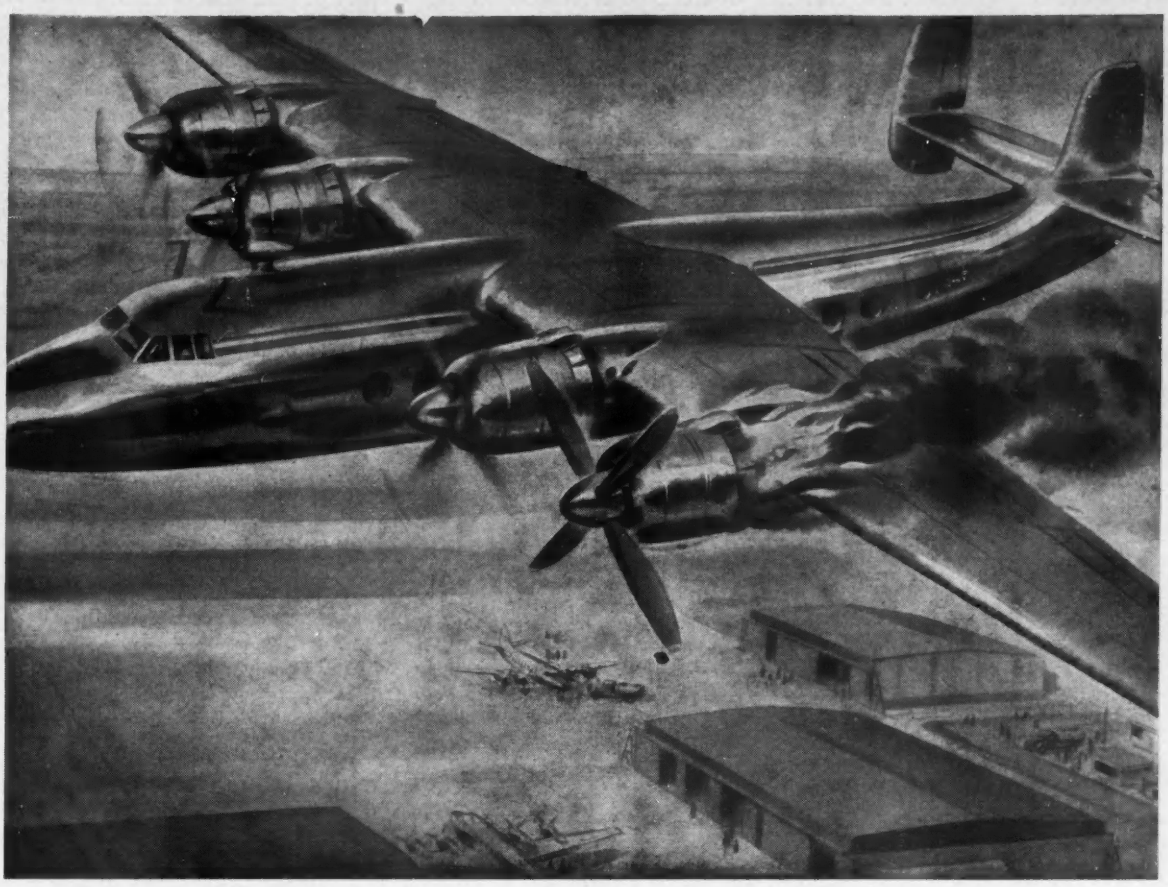
***Visidial* DEEP FAT FRYER**

Immersion oil heaters, anti-toxic, Admiralty bronze, halve the electric bill. Immense savings in fat or off-the-ration cooking oils. Variable thermostat with patented light-fail picture panel.

Approved for sale by London, South Eastern, Eastern, North Eastern Electricity Boards, etc., etc.

EVERY LARGE-SCALE KITCHEN A POTENTIAL CUSTOMER

Send for Catalogues to:
JOHN KELLY & SON
Head Office: 71 George Street, Edinburgh



Once this would have meant almost certain disaster . . .

Today it probably means no more than an extra job for the ground staff—for modern multi-engined aircraft will fly with one or more engines shut-down . . . provided the controls to the remaining engines are intact. This is one reason why most aircraft use 'Fibreglass' insulated Pren* cables which stand up to direct exposure to flame. Other reasons — which apply to all 'Fibreglass' electrical insulation — are less weight, less space, greater heat resistance, higher safe working-temperatures, freedom from alkali with consequent resistance to moisture. All of which mean longer life and greater reliability.

**'Pren' cables incorporate one or more layers of braided glass fibre and are finished with a fire-retarding lacquer.*

wrap it in* FIBREGLASS *for safety

TRADE MARK

DURABLE · FIRE-SAFE · ECONOMICAL · AND AVAILABLE NOW

FIBREGLASS LTD., RAVENHEAD, ST. HELENS, LANCS. (ST. HELENS 4224)

London Office: 63/65 Piccadilly, W.1 *(Hyde Park 2115)* · **Glasgow Office:** 136 Renfield Street *(Douglas 2687)* · **Manchester Office:** 11 Piccadilly *(Blackfriars 8863)* · **Newcastle Office:** 16 Dean Street *(Newcastle 20938)* · **Birmingham Office:** Piccadilly Arcade, 105 New Street *(Midland 0464)* · **Dublin Office:** 21 Merrion Square North *(Dublin 67060)*

Follsain-Wycliffe

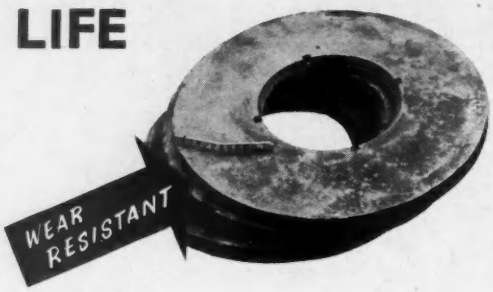
* Metals which save you MONEY

3 TIMES LONGER LIFE

is being obtained from Grinding Tables in

CY (REGD.) **Alloy**

at P.F. Stations



Other typical applications include EXHAUSTER FAN LINERS, ASH TROUGHS AND CHUTE LINERS, PYRITES SCRAPERS, BRAKE BLOCKS, ETC.

FOLLSAIN-WYCLIFFE FOUNDRIES LTD. LUTTERWORTH, nr. RUGBY Tel: 10 & 60

make it safe!

CASTELL

LOCKS

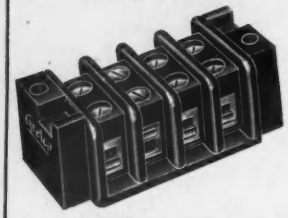
Adaptable to Electrical and Mechanical Equipment to ensure correct sequence of operations for protecting both Personnel and Equipment. Padlocks — Special Locks, etc., for all industrial purposes. Locking and interlocking schemes developed and supplied.

CASTELL LOCKS LTD.

30 WOBURN PLACE, LONDON, W.C.1

Telephone: MUSeum 2063/4

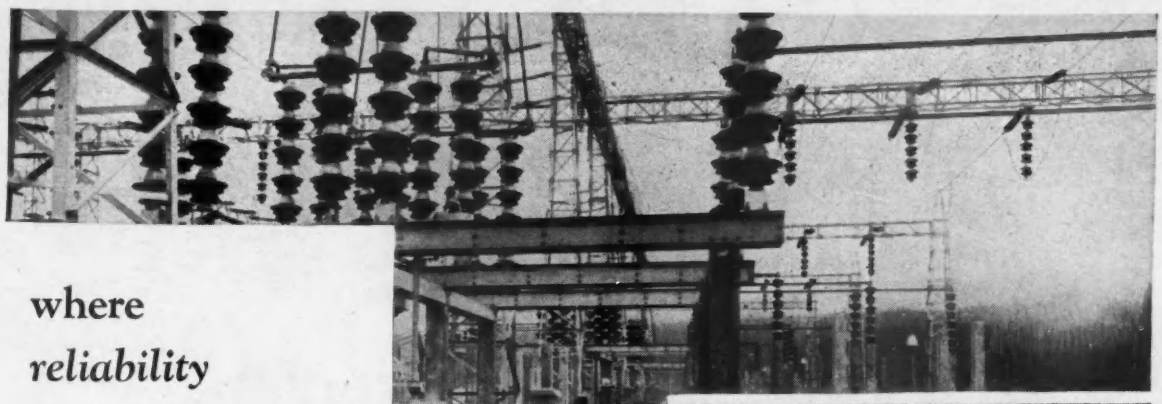
Grelco LIMITED

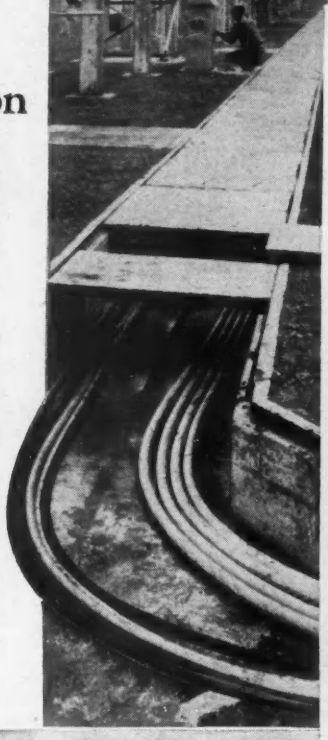


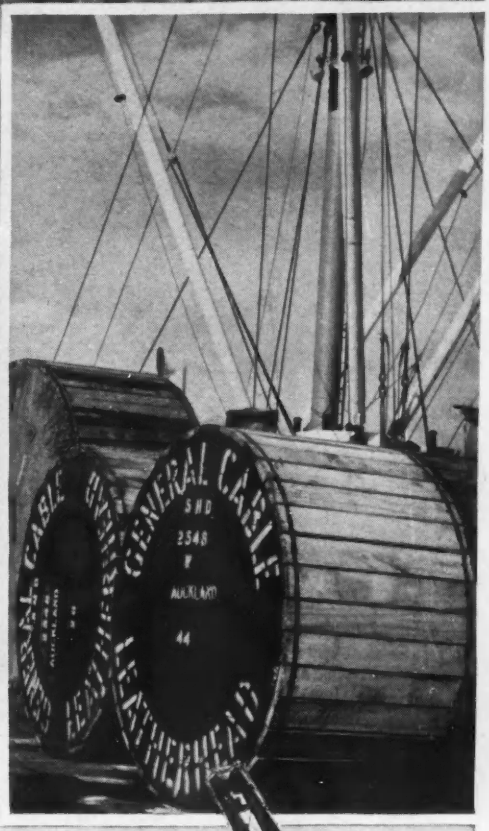
TERMINAL BLOCKS

Full particulars from:
GRELCO WORKS, MINEHEAD, SOMERSET

Telephone: MINEHEAD 740







where
reliability
is a
first consideration

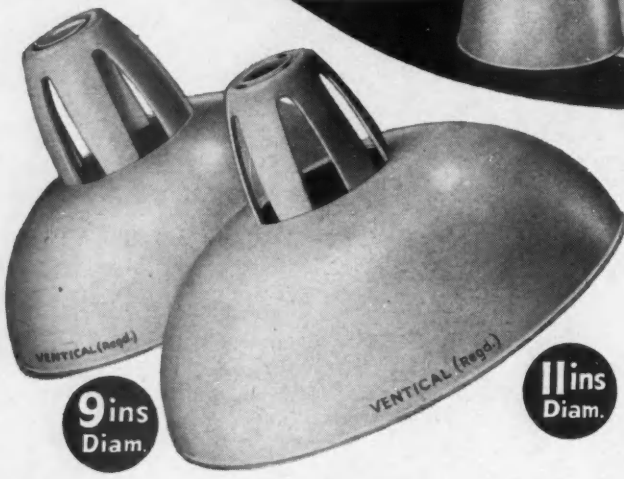
as in the control systems for the operation and protection of high voltage transmission circuits, GENERAL CABLES are being installed with confidence, because QUALITY is the keynote throughout the wide range of their production

GENERAL CABLES

Today prevent trouble tomorrow

THE GENERAL CABLE MANUFACTURING CO. LTD.
KINGSTON ROAD, LEATHERHEAD, SURREY Phone 3021/4

ENSURE A GOOD FINISH AT THE START



Volex

PLASTIC

SHADES

WHITE FINISH

Many of the leading industrial concerns, County Councils, Public Works Departments and Electricity Boards, etc. specify and fit "Volex" Plastic Shades because they know that for most efficient lighting, pleasing appearance and robust design they fulfil every requirement.

Send for fully illustrated leaflet giving full particulars of wide range.

"VENTICAL" (Regd.) PATTERNS

Separate ventilated gallery. Provides a high degree of illumination without glare and widely used by leading authorities.

Volex VOLEX ELECTRICAL PRODUCTS LTD
SALFORD 6

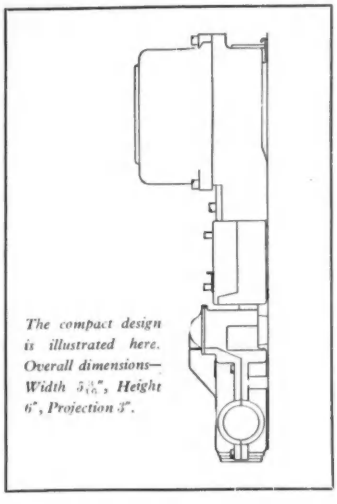
Telephone: PENdleton 4373 Telegrams: "VOLEXPROD", Salford 6

Printed in England by Staples Printers Limited at their Great Titchfield Street, London, establishment, for the Proprietors, THE ELECTRICAL TIMES LTD., and published at Sardinia House, Sardinia Street, London, W.C.2.

The NEW
60 AMP HOUSE SERVICE FUSE UNIT

NEW in design

Economy in space and production was the objective in the design of this unique cut-out. This has been achieved by the horizontal disposition of the cartridge fuse link above the sealing chamber, which feature has also led to a perfectly symmetrical shape. The unit is designed to accommodate cartridge fuse links of 60 amp capacity to BS 1361. All current carrying parts are tin or nickel plated, and the base contacts are secured in the mouldings by tapped brass inserts moulded into the base.



The compact design is illustrated here. Overall dimensions—Width 5⅛", Height 6", Projection 3".

EASIER to install

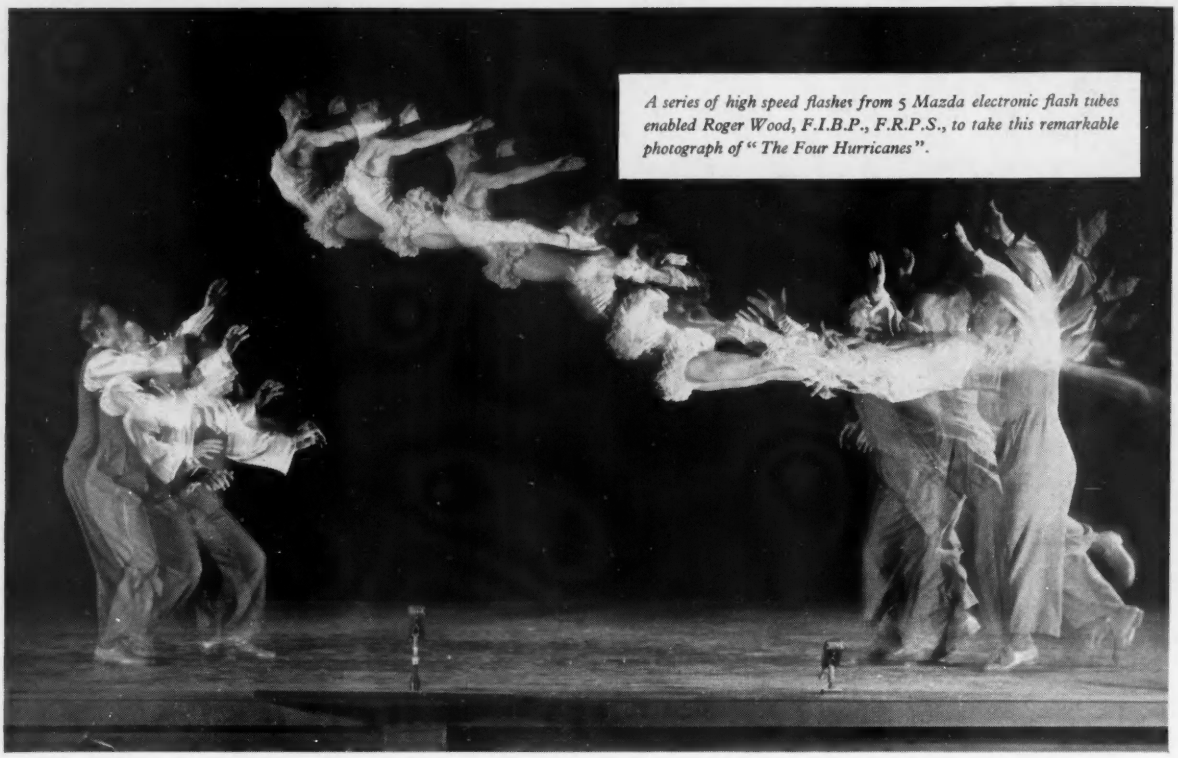
The fuse with neutral connector is an "all-in-one" unit, having an integral base chamber with the fuse carrier handle covering the fuse and the neutral connector chamber, and a separate cover for the sealing chamber. Full details are given in our List HS3.

Aeroflex HOPE'S PATENTS

PARMITER HOPE & SUGDEN LIMITED, MANCHESTER 12

London : 34 Victoria St., S.W.1. Glasgow : 5 Somerset Place, C.3. Birmingham : 39/41 Carrs Lane 4

dm PH. 81



A series of high speed flashes from 5 Mazda electronic flash tubes enabled Roger Wood, F.I.B.P., F.R.P.S., to take this remarkable photograph of "The Four Hurricanes".

Almost every important lighting development in the last 50 years owes something to BTH

THE SAME RESEARCH and manufacturing resources which produced the first jet engine of Whittle design and the electrical power system of the Comet are also behind Mazda lamps.

For half a century BTH has maintained its reputation for leadership in lighting. During that time many of its developments have become standard throughout the world.

Here are three examples from literally hundreds of recent achievements in the field of lighting.

A LAMP BRIGHTER THAN THE SUN

British Thomson-Houston is now making, in regular production, a lamp no more than six inches long, but some 25 *per cent brighter than the sun*. This lamp is prosaically catalogued as the Mazda FA.5, but it gives *the brightest light on earth*.

What is the Mazda FA.5 used for? Ophthalmologists wanted to photograph the inside of the human eye in colour. But colour photography needs a lot of light. If a bright light is shone into the eye, the pupil will automatically close, so the light must be a flash fast enough to beat the pupil. But if the flash is short enough to do this it must have extreme brightness to compensate.

It took BTH Research eighteen months to produce the Mazda FA.5 and thus solve the problem.

CLEVER DESIGN BEATS THE TIDE

At the new oil refinery at Shell Haven large numbers of tankers and oil barges have to be unloaded. At first the highly inflammable cargo could only be unloaded in daylight because the risk of fire from an artificial light was too great. They missed the night tide, and this caused a great delay in the turn round of the vessels.

Then the Oil Company brought BTH into the picture. Drawing on their experience of fluorescent lighting in mines, where safety is of paramount importance, BTH Engineers designed a Mazda Flameproof Fitting. BTH research tested this fitting over and over again by deliberately trying to cause explosions under the most carefully thought out and diabolical conditions. It also underwent the most exacting tests at the Buxton Testing Station of the Ministry of Fuel and Power, and came through with flying colours.

They unload now by day and night at the Shell Haven jetties.

MILLIONS OF FLASHES FOR ZEBRAS

All over the country the zebra crossings are getting their flashing beacons. There might not seem to be anything difficult about that.

But there was a problem indeed. Was there a lamp that would stand up to such sustained flashing? Could such a lamp be made?

The answer was surprising: the most suitable lamp was the perfectly normal Mazda lamp that we all buy in the shop. This lamp, operated with a slight voltage adjustment, can be flashed literally millions of times. It is not said for nothing that Mazda lamps stay brighter longer.

Mazda

the lamps and lighting fittings with

B T-H

behind them

THE BRITISH THOMSON-HOUSTON CO. LTD.
(Member of the A.E.I. Group of Companies)
4494